THE M25 ORBITAL MOTORWAY

M25 Department of Transport

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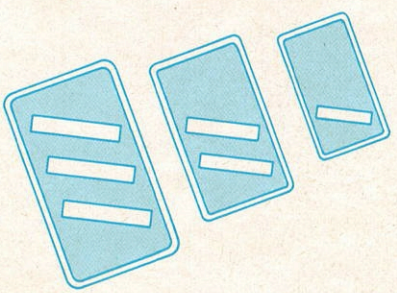
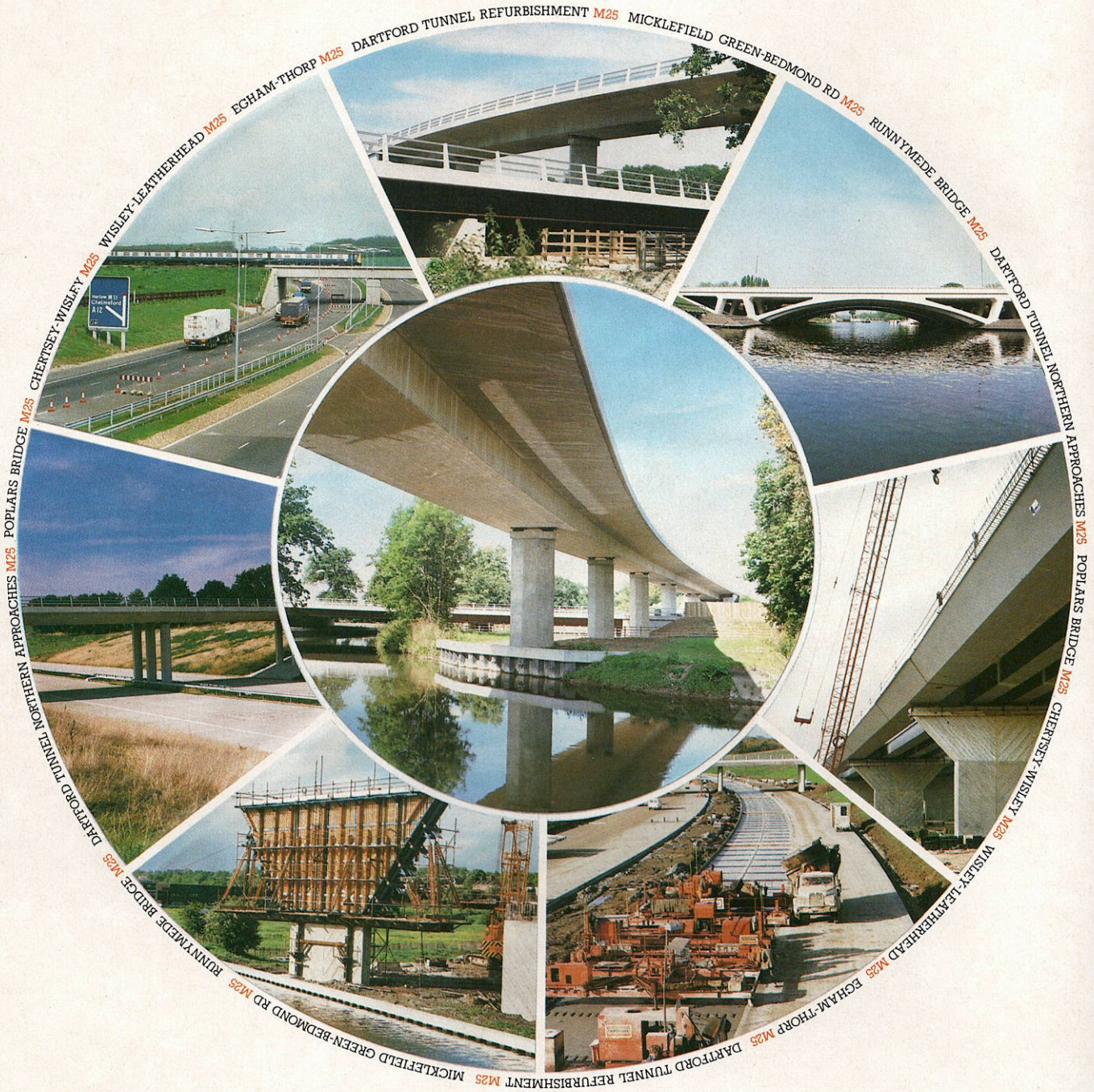


THE ALL-ROUNDERS



Fairclough, the pioneers of motorway construction in the UK, again established new records in motorway construction on the M25.
Fairclough built the largest viaduct (Gade Valley)... laid a most superior road surface (according to independent tests) ... and executed the largest bridge slide.

Fairclough

Fairclough Civil Engineering Limited

The AMEC Group

FOREWORD

BY THE SECRETARY OF STATE FOR TRANSPORT

"The M25 London Orbital Motorway is the longest city bypass in the world — 117 miles of communications vital to Britain's economy and to improving the quality of life in the capital and towns and villages previously clogged with traffic.

The achievements involved are vast. Remarkable feats of civil engineering are combined with a real concern for the environment and the overwhelming need to improve people's daily life.

The M25 is more than an impressive road. It is a testimonial to British expertise, not just in engineering but in successfully matching the demands of commerce and industry with those of leisure and local communities.

The road's completion serves to remind the nation and the world that Great Britain is a leader in design, construction, innovation and environmental improvement."

John Moore

Secretary of State for Transport

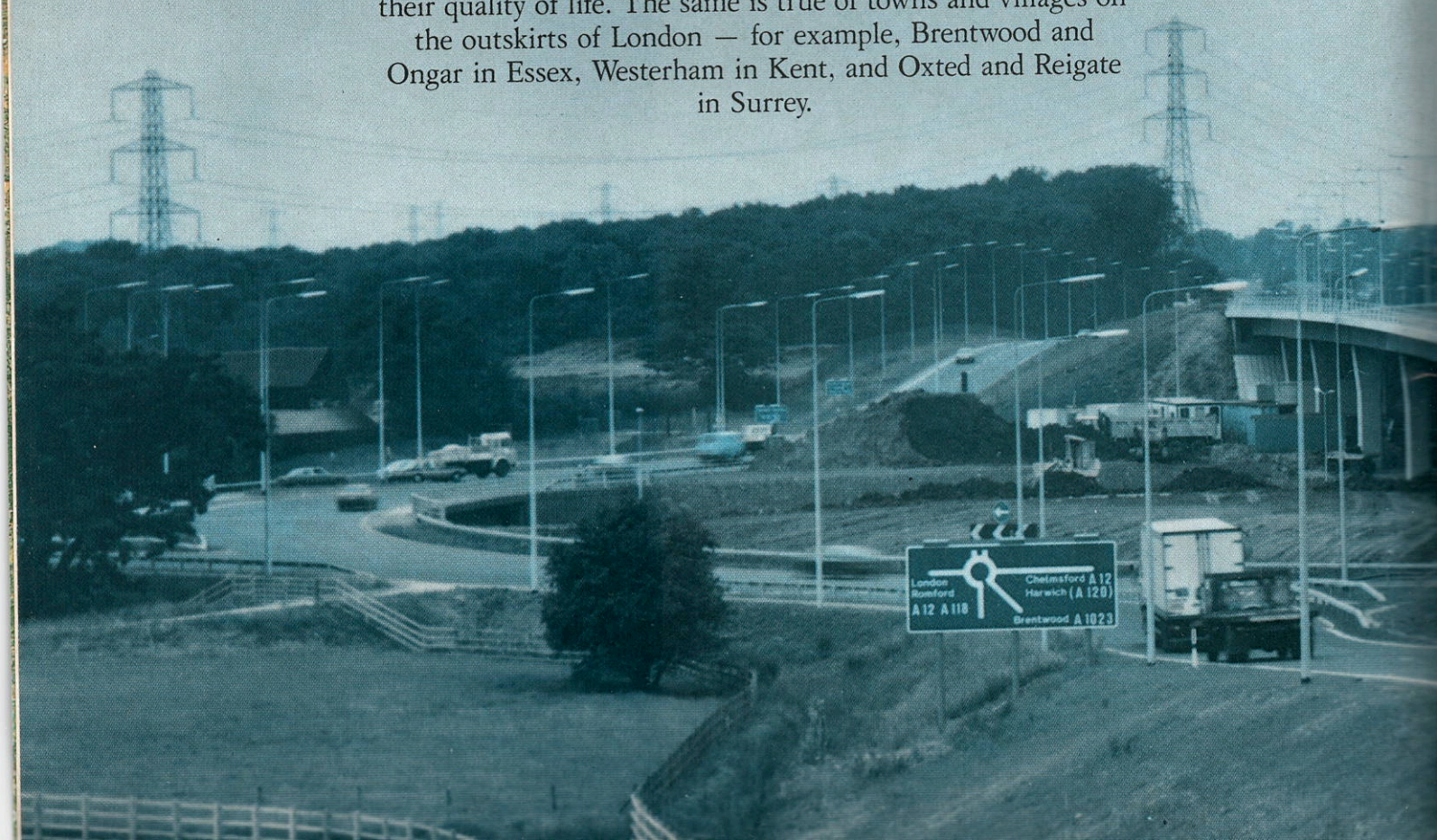
M25: OFF THE HIGH STREET – ONTO THE HIGHWAY

The opening of the final section of the M25 London Orbital motorway, brings two great benefits. For the traveller it provides easier, faster and cheaper routes round the capital. Instead of battling their way slowly through congested high streets in London and neighbouring towns and villages, drivers of cars and goods vehicles alike can "go into orbit" for part of their journey on a fast six- or eight-lane motorway. The alacrity with which drivers have taken to the Orbital, particularly as its later sections provided long continuous stretches, testifies to its proven value.

In particular, the M25 provides much improved routes from the Midlands and the North to the Channel ports; and very rapid connections between the region's four airports. Heathrow to Gatwick, for instance, is now generally not much more than 40 minutes. With the short M26 motorway from Sevenoaks to Wrotham, the Orbital provides much easier, faster travelling between places in Kent, Surrey and Hampshire.

Londoners benefit, too. They have learned to use sections of the Orbital as a means of getting to or from radial routes connecting other parts of London.

But many people have also gained as residents from improvements in their local environment. By diverting traffic — particularly heavy goods vehicles — away from main roads through London, the Orbital relieves whole communities of much of the noise, dirt and vibration that previously affected their quality of life. The same is true of towns and villages on the outskirts of London — for example, Brentwood and Ongar in Essex, Westerham in Kent, and Oxted and Reigate in Surrey.



THE LONGEST CITY BYPASS IN THE WORLD

The London Orbital is the world's longest city bypass. The actual motorway, circling London at a radius of between 13 and 22 miles (21–35 km) from Charing Cross, is 117 miles (188 km) long.

For the road surface alone contractors used more than 2 million tonnes of concrete and 3.5 million tonnes of "black top". Some 500,000 yards of crash barrier guard its central reservation.

Around 64 million cu yds (49 million cu m) of spoil was moved.

The M25 has 32 junctions. The most important of them, connecting with radial motorways and major trunk roads, are three- or four-level structures; others are two-level. There are 234 bridges over or under the motorway itself, with 30 more built on other motorways and trunk roads because of the Orbital.

The Orbital itself has two tunnels — the 711-yard (650 m) Holmesdale Tunnel at Waltham Cross; and the 514-yard (470 m) Bell Common Tunnel at Epping. The twin Dartford Tunnels, though with their approaches forming part of the M25 route, are all-purpose roads administered by Kent and Essex County Councils.

The Orbital motorway has 452 emergency telephones connecting with police control centres north, east, south and west of London.

Its extensive landscaping has involved the planting of more than 2.1 million trees and shrubs.

The statutory processes of approval included 39 separate Public Inquiries into routeing, side roads and property acquisition of different sections. Together they lasted more than 700 sitting days. They followed extensive consultation of the public, local authorities and other interested bodies.

Fifteen main contractors have helped to build the M25; seven different engineering consultants, as well as the Department of Transport's former Eastern and South-Eastern Road Construction Units, and Kent and the Greater London Councils, helped to design it. The Department's Eastern and South-Eastern Regional Offices have supervised design and construction.

The total cost of the motorway is very nearly £1,000 million — though it should be noted that £1 million in 1975, when the first short stretch near Potters Bar was completed, bought significantly more than £1 million in 1986.

The European Community contributed £5.8 million in transport infrastructure grants.

CONGRATULATIONS FROM THE AA TO EVERYONE INVOLVED IN THE NOW COMPLETED M25 PROJECT. THE NEW MOTORWAY WILL BRING ENORMOUS BENEFITS FOR DRIVERS BUT DON'T FORGET TO LISTEN INTO AA ROADWATCH ON YOUR LOCAL RADIO STATION FOR UP TO THE MINUTE TRAFFIC REPORTS WHICH WILL HELP YOU TO AVOID ANY PROBLEMS THAT MIGHT OCCUR.

AA ROADWATCH

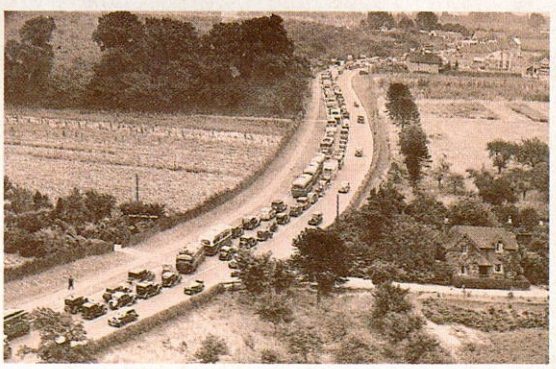
ORBITAL THINKING

Though the M25 can claim to be the world's latest, longest city bypass, the *idea* of an orbital highway skirting London's built-up area is not new. It dates back to the very beginning of the motor age.

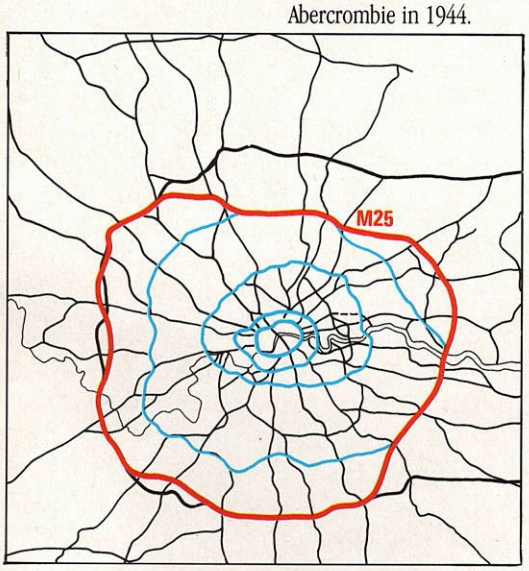
It was in 1905 that a Royal Commission on London's Traffic first suggested a ring-road solution. Far-sightedly, at a time when motor vehicles were a small (though increasing) proportion of all traffic, it proposed a ring at about 12 miles radius from the centre of London.

Subsequently, other rings or parts of rings were proposed, notably the series of concentric bypasses proposed in the 1940s by Sir Patrick Abercrombie and in the 1960s by the Greater London Council. Only small sections were built.

By the 1970s, however, the huge growth of motor traffic was clearly seen to demand a high capacity bypass, and led to firm Government plans for what became the M25.

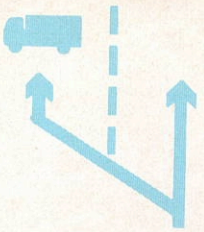


Below. Final as built route of M25 compared with the five ring road plan set out by Abercrombie in 1944.



"Became the M25" because parts of the London Orbital were planned or begun as separate relief roads north and south of London — the M16/Outer Orbital in the north, the original M25 in the south, relieving a congested A25 east–west through Kent and Surrey.

Then, in November 1975, the Minister for Transport, John Gilbert, announced that these would be subsumed into a single motorway ring, to be known as the London Orbital motorway (M25). At its closest (junction 24, near Potters Bar) it is approximately 13 miles (21 km) from Charing Cross; at its furthest (junctions 5 and 28, Sevenoaks and Brentwood) about 22 miles (35 km).



Four of the earliest sections were particularly valuable because they provided improved intersections with major radials: in the north with the A1/A1(M) Newcastle/Edinburgh route (now junction 23); in the south-east with the A2/M2 route to Dover (junction 2); in the south with the A23/M23 Gatwick/Brighton route; and in the south west with the M3 to Basingstoke and Southampton (junction 12). The first section actually to be opened (then as an all-purpose road), in 1975, was a stretch of 2.7 miles (4.3 km) from the A1/A1(M) to the A111.

As more and more sections of the motorway opened to traffic, its usefulness to motorists increased. One milestone came in January 1984 when completion of the eight-mile (13 km) section between junctions 25 (A10) and 27 (M11) meant that they could use a continuous 43 miles (70 km) of M25 between South Mimms (junction 23) and Swanley (junction 3). There was now a direct motorway link between the routes to the Channel ports (A2/M2 and A20/M20) and those to the Midlands and the North (A1(M) and, for the time being indirectly, M1).

A further key section fell into place with the opening in October 1985 of the 13-mile (21 km) Reigate to Wisley section. This completed the south-western quadrant and provided a direct motorway link between Heathrow and Gatwick airports. In February 1986 the opening of the eight-mile (13 km) Swanley to Sevenoaks section completed the south-eastern quadrant.

That left only the final 13 miles (21 km) from Micklefield Green to South Mimms still under construction. Its opening, ahead of schedule in October 1986, completed the north-west quadrant and the Orbital as a whole. It provides a direct, all-motorway link between the M1 and, in one direction, Heathrow, the M40, M4 and M3; in the other the Dartford tunnel, gateway to the Channel ports.

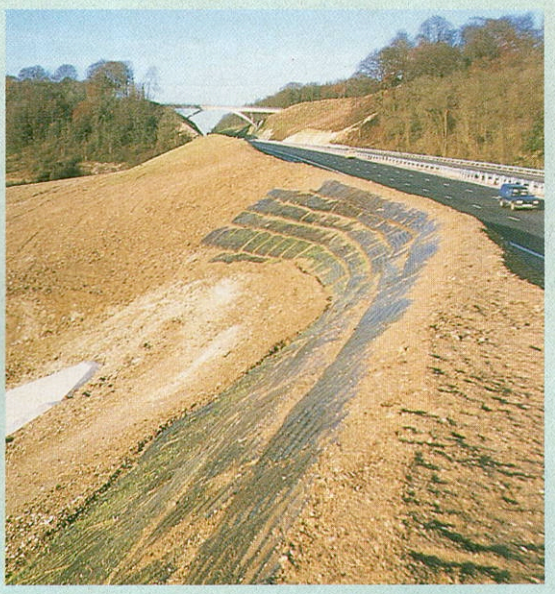
A FULL AND FAIR HEARING

While the building of the London Orbital motorway was, at least from 1975 onwards, established Government policy, the actual manner of achieving that policy was subject to a series of Public Inquiries, preceded by public consultation on possible variants.

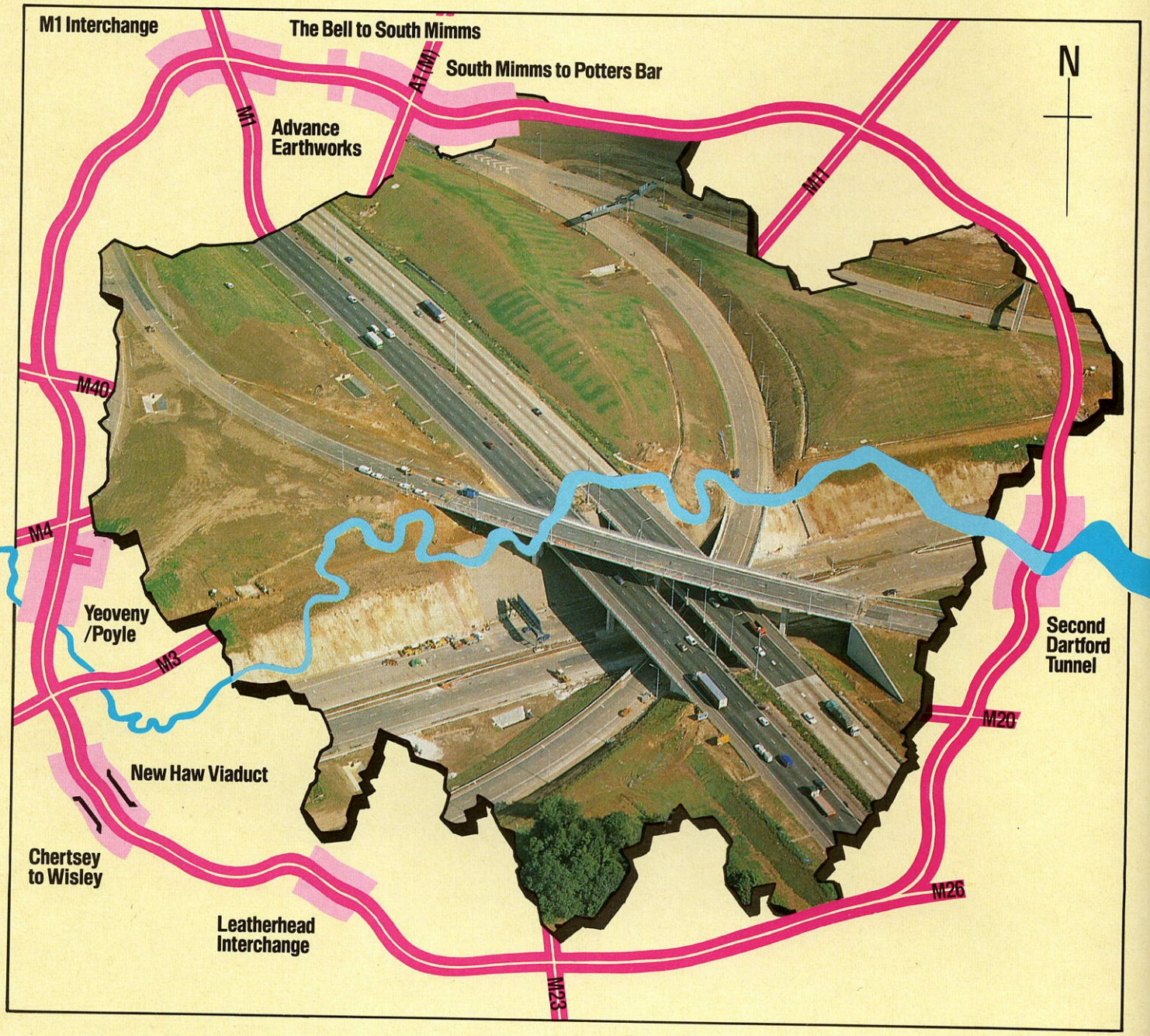
In all, the various sections of the route were subject to no fewer than 39 Public Inquiries into route, compulsory purchase of land and treatment of subsidiary roads. They lasted in total more than 700 sitting days. After each inquiry Ministers had to decide, with the help of their advisers, whether and to what extent to accept the findings of the Inquiry Inspector.

In a number of cases an Inspector's recommendations significantly altered the way in which the motorway was built — for example, more than doubling the length of a tunnel proposed by the Department at Epping Forest; and a more extensive use of cuttings and false cuttings to hide the road as it passed through an Area of Outstanding Natural Beauty between Swanley and Sevenoaks.

Some objectors were concerned about the effect on their homes or agricultural holdings; others about the general impact of the road on the environment or traffic patterns; others again about the continuity of public footpaths or the effect on countryside recreation. The ultimate decision on each section represented a balancing of the advantages of the road to the community against disadvantages to individuals and groups, and of the benefits of environmental protection measures against their cost.



M25
LONDON ORBITAL MOTORWAY



M25 — nine sections completed by Balfour Beatty.

From our first contract at South Mimms, to the East of the A1 (M), to our last at South Mimms to the West of the A1 (M), we have carried out nine contracts on the M25.
We are pleased to have been associated with Britains biggest ring road — a great engineering achievement.

BB
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Balfour Beatty

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Randolph House 46/48 Wellesley Rd, Croydon, Surrey CR9 3QD
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IN ORBIT ROUND THE CAPITAL

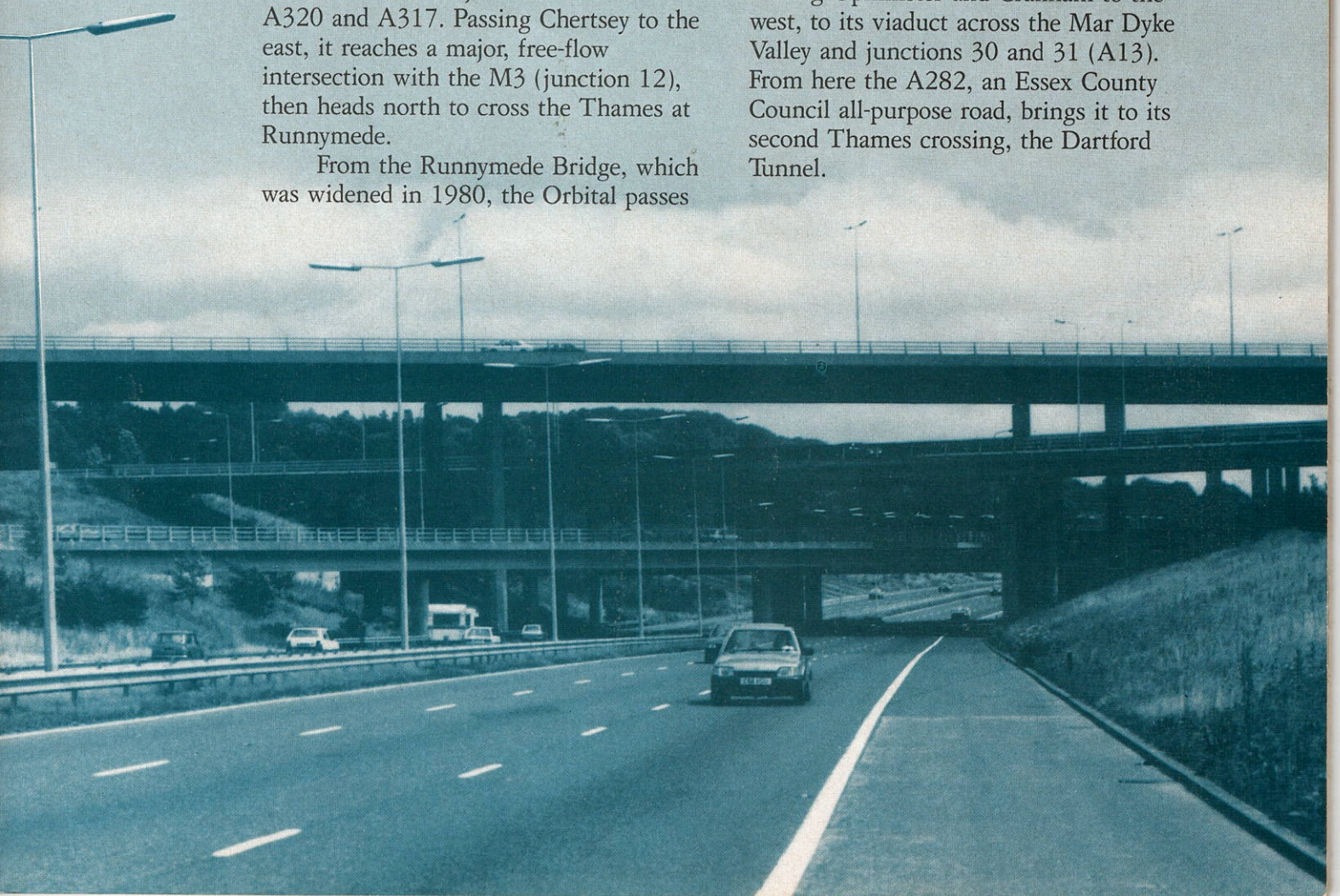
CLOCKWISE FROM THE DARTFORD TUNNEL

From the southern portal of the Dartford Tunnel, a Kent County Council road (the A282) provides a short length of the Orbital's route as far as junction 2 (A2). Here the motorway proper begins and runs south-west to the M20 at Swanley (junction 3); then west of the Darenth Valley to junction 5 (M26 and A21), north of Sevenoaks. From here the Orbital runs westwards, with the North Downs to the north and Westerham and Limpsfield to the south. After junction 6 (A22) it reaches the multi-level free-flow junction with the M23 (junction 7) before climbing to its highest point at Reigate Hill (junction 8, A217).

From junction 8 the motorway heads north-west across Walton and Headley Heaths to pass between Leatherhead to the south and Ashtead to the north. A link road in the elongated or "split" junction 9 (A243) also serves as part of Leatherhead's northern bypass. The Orbital then follows the valley of the River Mole with Stoke D'Abernon to the north to reach junction 10 (A3) at Wisley Common. From there it turns northwards (with Byfleet to the east) then north-west to junction 11 with the A320 and A317. Passing Chertsey to the east, it reaches a major, free-flow intersection with the M3 (junction 12), then heads north to cross the Thames at Runnymede.

From the Runnymede Bridge, which was widened in 1980, the Orbital passes west of Staines and Heathrow Airport. After connecting with the M4 (junction 15) it runs along the west side of the Colne Valley to an interchange with the M40 (junction 16) north-west of Uxbridge; then, passing east of Gerrards Cross and west of Watford, it heads east, crossing the Gade Valley at Kings Langley. After connecting with the M1 (junction 21) north of Garston, it continues east to London Colney, then runs south-east to connect with the A1(M) at South Mimms (junction 23).

From there it runs east to the A111 between Potters Bar and Barnet, then on to junction 25 (A10) at Enfield. East of this it passes through the first of its two cut-and-cover tunnels, then along the fringes of Epping Forest near Upshire. At Bell Common, south of Epping, comes its second cut-and-cover tunnel; then a major free-flow junction with the M11 at Theydon Garnon (junction 27). The Orbital now heads south-east across the River Roding to the A12 at Brook Street west of Brentwood; south to the A127, then, leaving Upminster and Cranham to the west, to its viaduct across the Mar Dyke Valley and junctions 30 and 31 (A13). From here the A282, an Essex County Council all-purpose road, brings it to its second Thames crossing, the Dartford Tunnel.



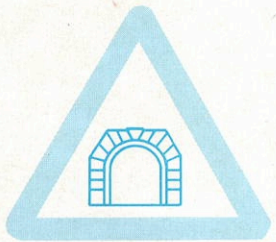
The greater part of the responsibility for choice of route and of engineering solutions, as well as of defending and implementing that choice, fell on professional engineers. Altogether, more than 1,000 of them were involved: as members of the Department of Transport's regional teams, as partners and staff of consultant engineering practices and as members of contractors' management teams. In a typical contract of the Orbital, for example, comprising only a part of one of its four quadrants, DTp resident engineer's staff alone could easily number 30.

But the prime responsibility fell on the Department's two Directors (Transport) and their project managers. On them fell the responsibility for advising Ministers on routes and ways of achieving them; for weighing the points made in the extensive official and public consultation exercises; and in the end theirs was often the crucial voice. Having tendered their advice, whatever the outcome, they had to make the chosen route and chosen solutions "stand up".

It was they who bore the burden of days on end in the witness box at Public Inquiry; they who ultimately had to produce convincing answers to the relentless questioning of counsel for the objectors; they who had to ensure that contractors could and did build each section of the motorway within the time and cost limits set.

The M25 is, of course, not perfect. Within such a time-scale and with such conflicting cost, traffic and environmental constraints, no road could be. But — for all the carping at occasional congestion or teething troubles — it IS a tremendous achievement. The Victorians would have blown many trumpets; our generation uses the road and, if forced to slow down temporarily to 50 mph, grumbles.

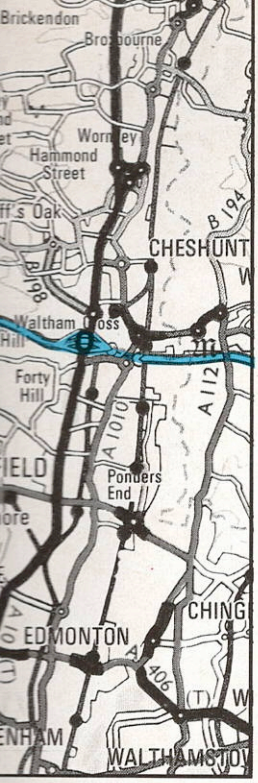
Yet we should, and must, give credit where credit is due. The Orbital is one of the major civil engineering achievements of the century. It was made possible by a remarkable team effort. And the pivot and linchpin of that team was the professional engineer.



Holmesdale and Bell Common Tunnels

Among the outstanding civil engineering structures on the M25 are the two tunnels in its north-eastern quadrant: the Holmesdale Tunnel at Waltham Cross (between junctions 25 and 26) and the Bell Common Tunnel at Epping (between junctions 26 and 27).

Holmesdale is a 711-yard (650 m) cut-and-cover tunnel. The original plan envisaged an open cutting but, to preserve the environment of housing estates to the north, the Department agreed to build a



"lid" over it. The houses had been built in the knowledge that they lay alongside a safeguarded road line. But it was safeguarded for a four-lane road at ground level, not the six lanes which, to provide grade separation for local roads, needed to be either higher or lower.

First thoughts suggested a long, elevated viaduct where junction 25 and the tunnel now are; second thoughts took account of the unpleasant effect this would have had on the environment and substituted a cutting; and further consideration settled on a cut-and-cover tunnel.

This, however, faced the designers with a problem. How could they, within the tight confines of the tunnel site, build six lanes of motorway plus hard shoulders, with side and central walls, and provide access through the site for other operations?

Their chosen solution was a propped cantilever with diaphragm walls for the permanent tunnel walls and a beam and slab roof to provide the prop. Diaphragm walls permitted very heavy reinforcement (cages of up to 50 mm diameter bars weighed up to 17 tonnes) which ensured that the cantilever system worked properly.

Tarmac Construction won the contract to build the 1.8 mile (2.9 km) section of motorway which includes the tunnel; it was opened three-and-a-half years later. This section, which cost £28.6 million, also involved a bridge over the diverted River Lee Navigation. The actual tunnel cost around £13.75 million.

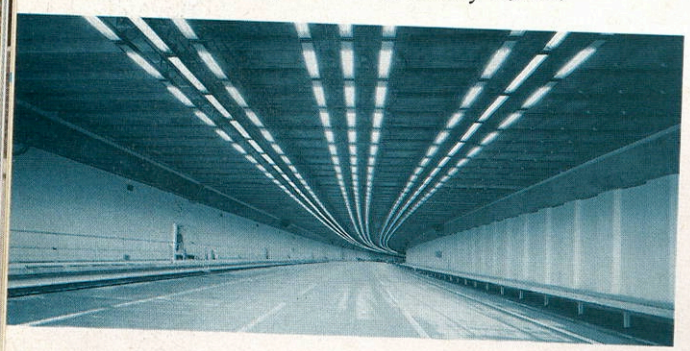
The diaphragm walls, constructed under sub-contract by ICOS (GB), were at the time the largest in the country, covering an area of 290,000 sq ft (27,000 sq m). ICOS used five crane-mounted grabs to excavate metre-wide trenches for the walls, stabilising the ground with bentonite slurry. They then pumped in more than 880,000 cu ft (25,000 cu m) of concrete to form the tunnel walls.

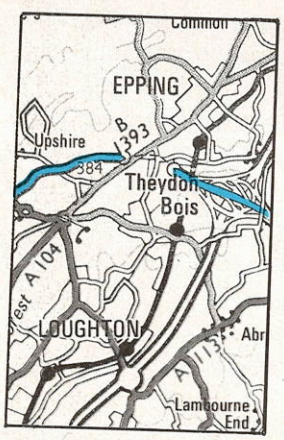
Fairclough Engineering manufactured the 802 pre-cast beams for the tunnel roof. The largest of them weighed 39 tonnes. The contractors then excavated the ground between the tunnel walls with a mechanical shovel and dumper trucks. The Health & Safety Executive monitored this operation to ensure that men working on it had sufficient ventilation.

Like the nearby Bell Common Tunnel, Holmesdale has an automated control system, believed to be the first installed in a motorway tunnel anywhere in the world. A computer system monitors ventilation, lighting, pumps and drainage, fire protection and security, receiving information from 300 different positions in each tunnel. Pumps are needed because the tunnel has a dip in it. Television cameras in the tunnels also provide police at the Chigwell control centre with a view of the interior of the tunnels.

The shorter Bell Common Tunnel (514 yards, 470 m) was substituted for a cutting to minimise its impact on an attractive part of Epping Forest. Its outer walls are formed of rows of interlocking concrete piles reinforced with steel beams, the centre wall of piles alternating with concrete block walls. On the piles rest 628 pre-cast concrete beams, and on these an *in situ* reinforced concrete slab. The tunnel needs no pumps because it has a hump rather than a dip and can drain by gravity.

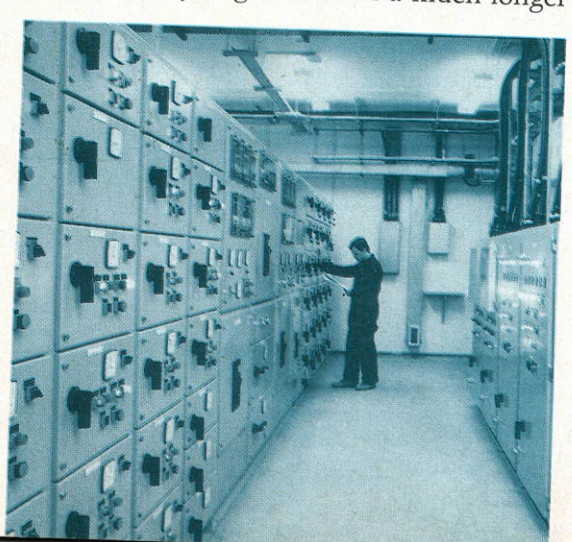
Bell Common Tunnel formed part of a 4.1-mile (6.6 km) section of the motorway for which G Maunsell were the engineers and Laing the contractors. Work on the £29.1 million contract began in June 1981; the road opened in January 1984.





Cricket on top of the M25

Epping Foresters Cricket Club, founded in 1947, plays its home matches on top of the M25. Its ground at Mill Plain is on licence from the City of London Corporation. Mill Plain (alongside Bell Common) lay right on the proposed route of the motorway. Evidence advanced at the Public Inquiry into this section by the club's trustees and by the Superintendent of Epping Forest convinced the Inspector that this length of the motorway ought to be in a much longer length of cut-and-cover tunnel rather than open cutting, and that the cricket pitch should be reinstated on the "lid" of the tunnel.



Mr George Adams, former captain and present trustee of the club, was the main witness on its behalf. He says Epping Foresters are very happy with the new ground and with the new and larger pavilion which the Department of Transport also paid for. The Lord Mayor of London, Sir Alan Davis, formally opened the new pavilion on 12 May 1986, the day of the Foresters' first match on their reinstated ground. The Department also met the cost of a temporary home ground for five of the six seasons in which the club lost the use of the Mill Plain ground. The cricket ground was created by Golf Landscapes.

Mr John Besent, Superintendent of Epping Forest, sums up the advantages the tunnel gives to the forest "in one word: continuity — visual continuity, physical continuity, and continuity for wildlife".

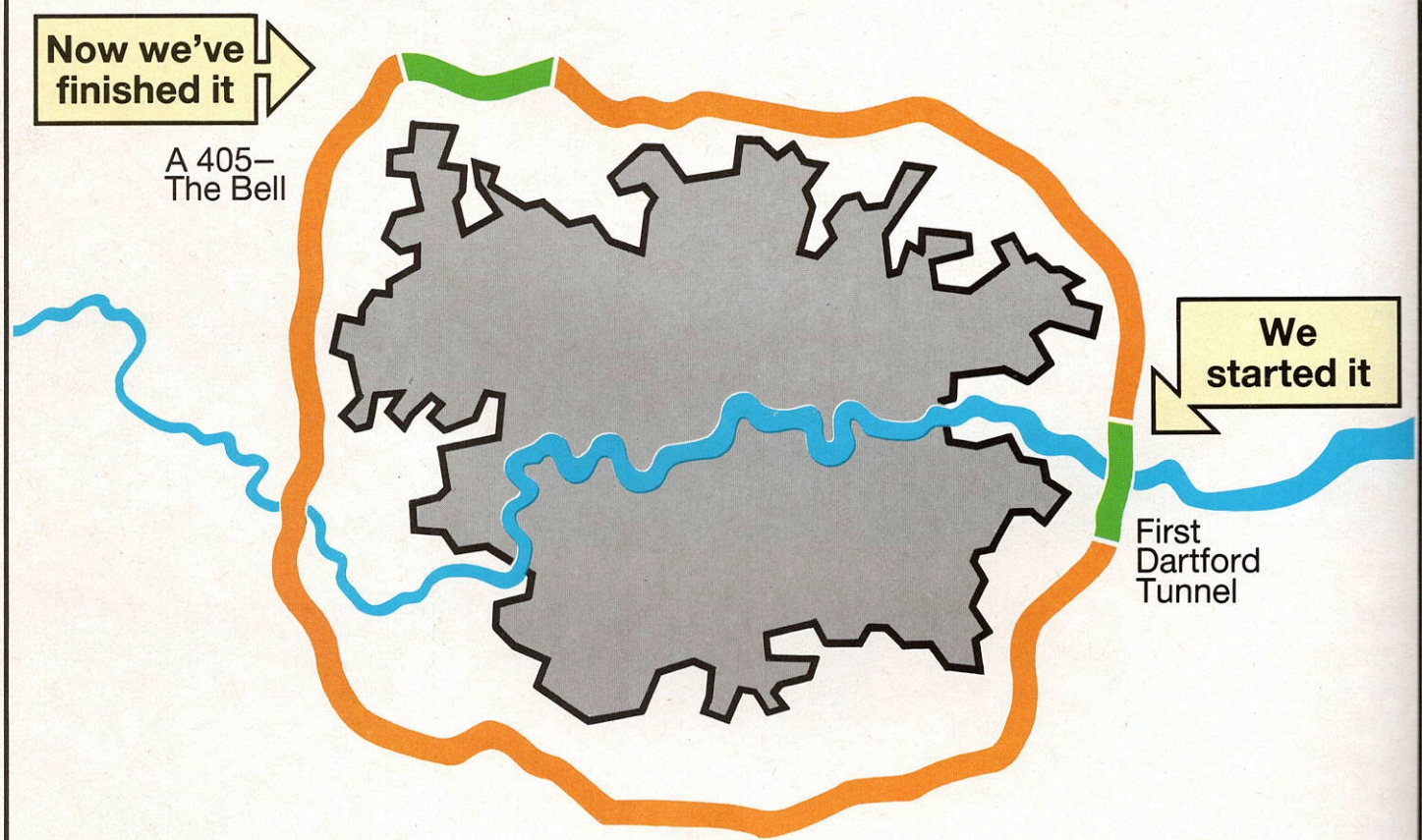
House removal

It was on this stretch, too, that the Department ventured into the house removal business. Right in the path of the east-facing exit slip road at junction 26 stood a pretty little gate-lodge to Upshire Hall. A Grade II listed building, it dated from the early nineteenth century and took the form of a thatched "cottage orne" with leaded windows in distinctive ogee-shaped arches. It was an attractive and well-liked part of the local scene.

The solution agreed was to dismantle this single-storey building and re-erect it close by on the north side of the motorway. In the event, the consultants, Anglian Architects, found that it crumbled as they touched it. Instead, it was re-erected — very faithfully — in replica, at a cost (borne by the Department) of some £70,000. It is visible, both from the motorway and elsewhere, and provides a pleasant and unusual glimpse from the 1980s of a whimsical fashion of the early 1800s.

M25

again our achievements speak for themselves



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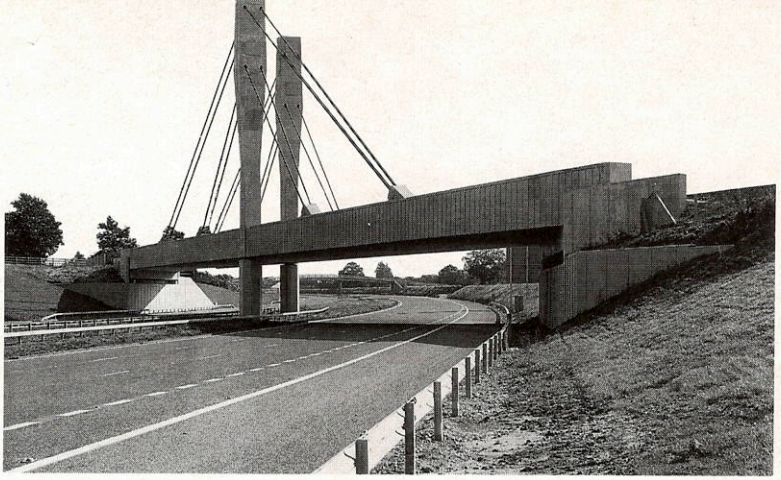


oiseless rubbish

the M25's north-western quadrant, the ıte of the last section to open runs across me very unstable ground with no fewer ın four former gravel pits filled with ɔbish within a three-mile stretch of the ıte. This was part of the price paid for ɔiding an environmentally more sensitive ıte further south.

From three of the pits the rubbish was ıoved and suitable fill substituted where cessary. The rubbish — the equivalent of million domestic dustbins — was buried l sealed into bunds on either side of the ɔtorway, at the same time avoiding nsporting unpleasant refuse through the ıntryside and helping to provide noise riers.

A lot of water in the fourth pit posed ıore complex problem. The solution ised by the engineers first pumped the dry; then, with the pumps still working, ɔlied a technique known as "dynamic ısolidation". This consists broadly of ng a crane to drop a 16-tonne weight 50 (15 m) on to the top of the fill terial.

This process, carried out four times r an area of 26,000 sq yds ,000 sq m), pushed the refuse down as ch as 3 feet (1 m) in places and provided able base for the road.

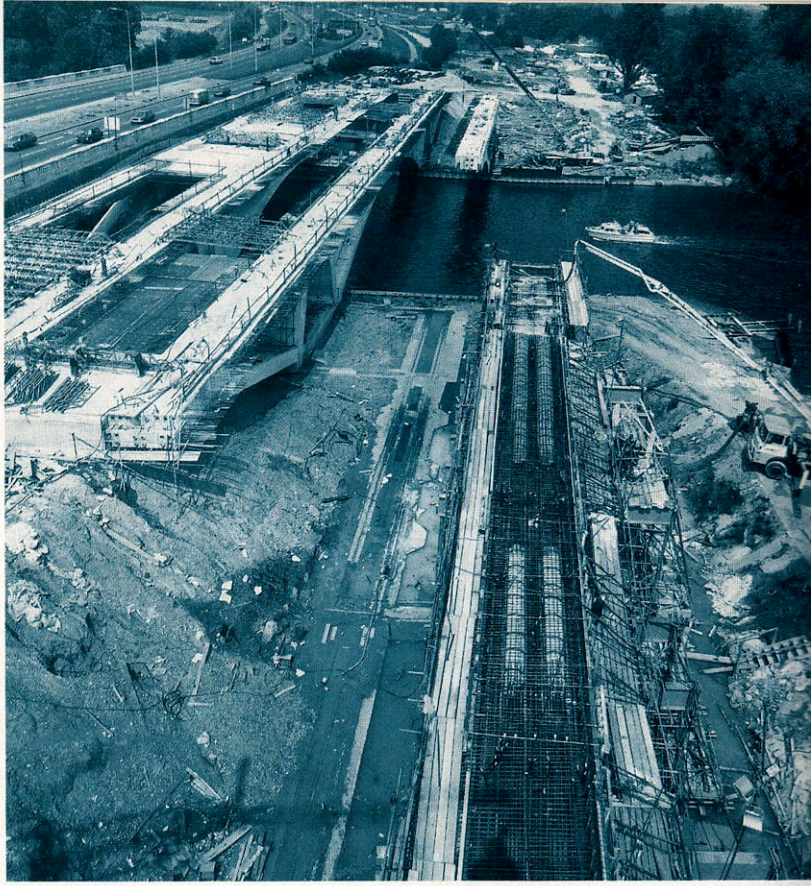
Bridges and viaducts

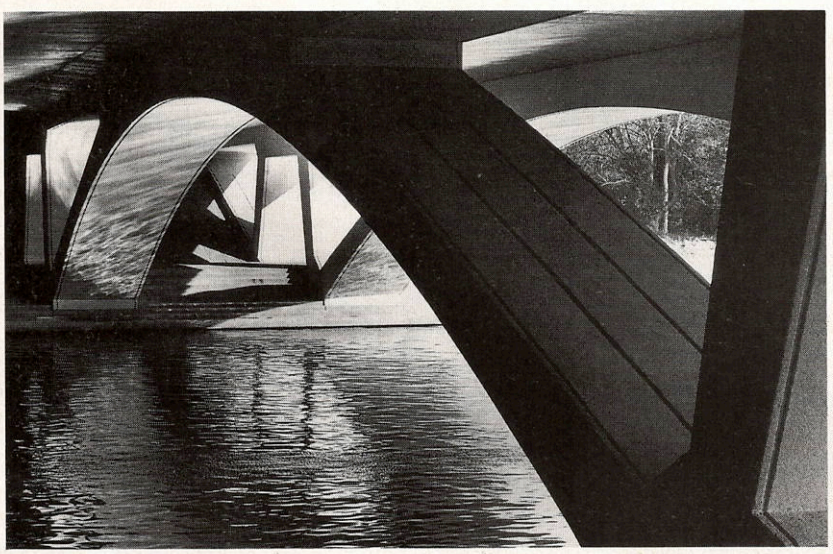
Other civil engineering structures on the M25 include a number of notable bridges and viaducts.

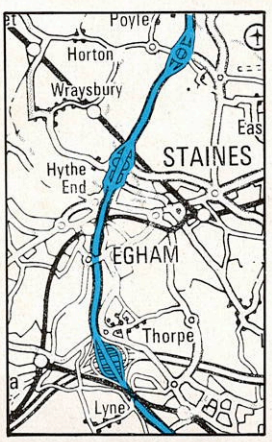
Perhaps the most striking structure from the motorist's viewpoint is the bridge carrying the Chertsey–Virginia Water railway line over the motorway. Designed by British Rail Southern Region and Stressed Concrete Design Ltd, it crosses on a 60-degree skew and has two towers rising nearly 100 feet (30 m) above the carriageway from which cables support the two spans, together 120 yards (110 m) long. It is the first pre-stressed concrete cable-stayed railway bridge in Great Britain.

The 310 yard (285 m) long New Haw Viaduct at Byfleet carries the Orbital over both the London–Portsmouth/Southampton railway line and the River Wey Navigation. Designed by Gifford & Partners, it is for the most part of post-tensioned *in situ* concrete construction, with pre-cast concrete beams for the span crossing the railway.

The Orbital's western crossing of the Thames is at Runnymede, where an existing bridge and a new one together carry both the M25 and the Staines bypass across the river. The presence of the existing bridge, designed by Sir Edwin Lutyens, posed both aesthetic and structural problems. The consultant engineers Ove Arup & Partners, assisted by their associated architectural practice Arup Associates, succeeded in designing a graceful concrete bridge which is similar in line to the Lutyens original. The Lutyens bridge, (opened in 1961, although designed earlier) carries the northbound carriageways of both the M25 and the A30, the Arup bridge the southbound carriageways of both roads.







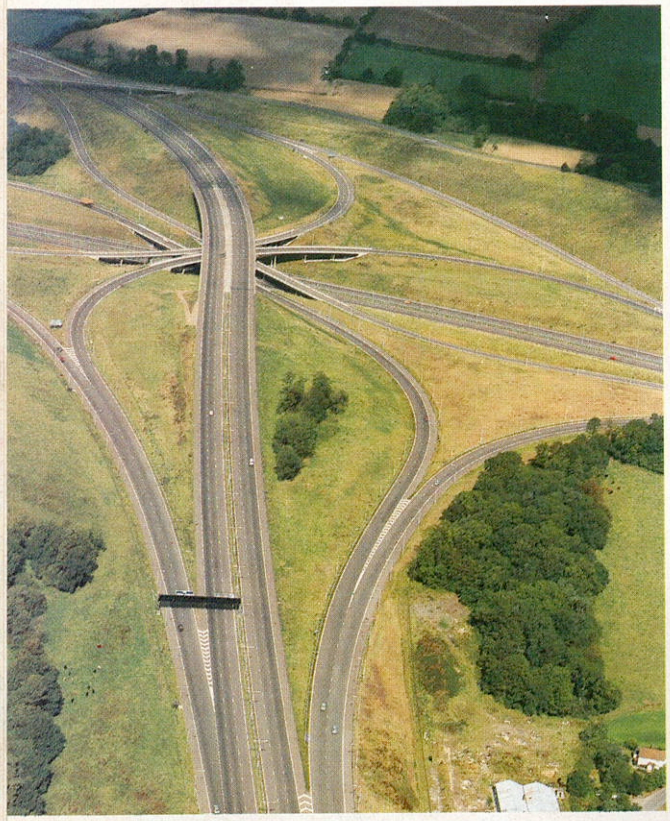
As the motorway makes its way through the Buckinghamshire countryside to the east of Gerrards Cross, it comes to a five-span blue-brick railway viaduct built in the early 1900s to carry the Ashendon–Northolt railway line across the valley of the River Misbourne. The designers of this section of the Orbital contrived to thread the two carriageways of the motorway, with reduced hard shoulders, through the viaduct's arches — one carriageway through each of two of the three central spans. The River Misbourne they diverted under another of its arches.

Further north Brian Colquhoun & Partners, in succession to the Eastern Road Construction Unit's Hertfordshire Sub-Unit, designed the 480-yard (440 m) long Gade Valley Viaduct which carries the motorway across a valley containing the Grand Union Canal, a stream, a road and the main London–Birmingham electrified railway. As well as clearing the overhead power lines of the railway below the viaduct, the contractors had to negotiate a CEGB grid power line above.

The viaduct consists of 11 spans, mostly of about 46 yards (42 m), with piers set at an angle of 20 degrees to the motorway to maintain views along and parallel to the canal.

20 *Major interchanges*

The major interchanges on the M25, travelling clockwise from the Dartford tunnel, are:



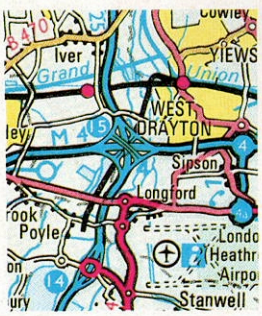
South of the Thames

Junction 3 (M20), south-east of Swanley: is a three-level structure where main turning movements are catered for by direct slip roads and others via a roundabout.

Junction 5 (M26, A21), at Chevening, north-west of Sevenoaks, is a partial interchange, with no access between M26 and A21. The low-lying, free-flow interchange helps to minimise impact on a sensitive landscape.

Junction 7 (M23), Merstham, has four levels and free-flow connections between the two motorways. Designed in the late 1960s and built between 1972 and 1976, it formed part of the first section of the Orbital to be built south of the Thames. The M23 passes over the M25 at a height of 75 feet (23 m) on a five-span steel box girder bridge.

Junction 12 (M3), near Chertsey: a two-level cyclic design is used here to reduce the overall height on the edge of the Thames Valley, close to the 164 feet (50 m) high St Ann's Hill. Continuous span bridges with hollow reinforced concrete decks were used to reduce weight and so save on the cost of foundations.



North of the Thames

Junction 15 (M4), north-west of Heathrow, is a four-level interchange rising to a height of 69 feet (21 m). It comprises eight bridges and three viaducts of between 198 yards (182 m) and 288 yards (264 m) and allows free-flow movements. Extensive landscaping helps to reduce its impact and integrate it into the flat terrain of the

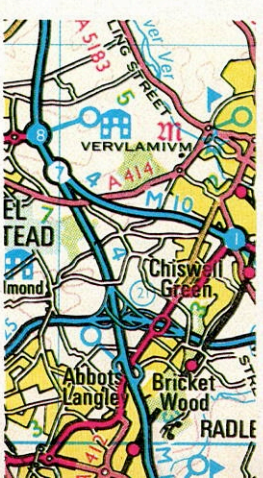
Thames Valley. The interchange was designed to be built in such a way as to maintain traffic flows on the M4. The contractors imported some 4.5 million cu yds (3.5 million cu m) of fill material to form the mounds and hills that support and mask its component carriageways and slip roads.

Junction 16 (M40)'s location, in the Alderbourne Valley south-east of Gerrards Cross, demanded an unobtrusive design, and predicted traffic movements called for a free-flow interchange between the M40 west of the junction and the M25 south of it. The result is a two-level junction with links and loops. Those serving the heavily-used west-to-south and south-to-west movements are gently curving; others have tighter radii. Much of the junction is sunk below the skyline, extensive use is made of earth-mounding and shaping, and more than 180,000 trees and shrubs have been planted which, as they mature, will increasingly soften and disguise its seven miles (11 km) of carriageway.

Junction 23 (A1(M)), at South Mimms carries the M25 over the existing roundabout to follow the route of the old A6.

Junction 27 (M11), at Theydon Garnon, south-east of Epping, is a two-level arrangement in which all connecting movements are by free-flow two-lane links with hard shoulders. Limiting the interchange to two levels reduced its impact on its surroundings, but could be achieved only by construction of seven bridges, five of them built over a "live" M11.

Junction 21 (M1), north-east of Watford, is a four-level structure, in which a top link road from M25 westbound to M1 north passes over the M1, while the main M25 carriageways and the M1-southbound-to-M25-west link road pass under the M1. This arrangement, together with extensive contouring and planting, reduces the junction's visual impact. Some connecting movements are made via junction 21A and M1's junction 6, using the A405 as a link road.



A ROAD TO FIT THE LANDSCAPE

The money, effort and skill put into landscaping the M25 motorway are on a scale that would have astounded the builders of Britain's first motorways. More than 2.1 million trees and shrubs have been planted over the whole of its 117 miles (188 km). At the multi-level interchange with the M40 alone, the number planted is some 186,000.

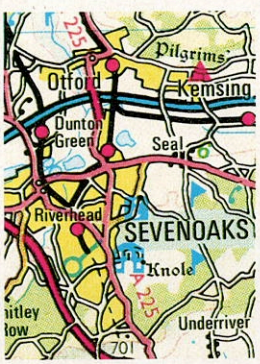
But landscaping means much more than planting. The Department of Transport's landscape architects have been crucially involved in the design of every section of the M25 from the selection of routes onwards.

The landscape architect looks for likely routes on the map; he walks or drives along up to half a dozen different possible lines, appraising their landscape and environmental impact. He assists the independent Landscape Advisory Committee in making a recommendation to Ministers. Then, when a preferred route has been selected, he works with his highway engineer colleagues to prepare a detailed scheme including proposals for earth-mounding and contouring as well as planting.

Landscape architects for the Department attended and gave evidence at Public Inquiries on each section of the Orbital motorway, and on occasion prepared detailed landscaping schemes for the alternative routes put forward by objectors. The Department's horticulturists supervise implementation of their landscape proposals; maintenance is carried out on an agency basis by the Forestry Commission.

Most of the landscape work for the M25, from route selection onwards, was done by a senior landscape architect in the Department's own Landscape and Horticultural Section. On part of the north-eastern quadrant, the Department used consultants Gordon Patterson & Partners.

The aim of motorway landscape design is to integrate the motorway corridor into adjoining landscape, with land form as well as varieties and placing of trees and shrubs matching those of neighbouring areas. Paradoxically, where it succeeds best it is least noticed.



Environmental measures and wildlife

Landscaping can help to minimise noise and visual disturbance to communities on either side of the motorway and create pleasing views for motorist and resident alike. The M25 has made increasing use of earth-mounding, sometimes topped by fence-type noise barriers; of cuttings; and of false cuttings — created by building a "lip" of two or three metres to the lower side of a road running along the side of a hill. In the huge but low-lying M40/M25 interchange, contractors moved some 588,600 cu yds (450,000 cu m) of spoil to hide or minimise the impact of the motorways and slip roads.

Clearly, the two most notable environmental protection measures are the Holmesdale and Bell Common Tunnels (described earlier); but, as on other motorways so on the M25, the Department has made increasing use of earth mounding and contouring to reduce the impact of traffic noise on nearby houses and mask residents' views of moving traffic. A good example of what such measures can achieve is found on the Swanley–Sevenoaks section, where considerable effort, money and skill were used to reduce the Orbital's impact on the Kent Downs Area of Outstanding

THE ASSOCIATION OF CONSULTING ENGINEERS

Completion of the M25 is a notable milestone in the development of the UK's motorway network. It is also another example of the contribution which British consulting engineers make to the creation of modern highway systems throughout the world.

Members of the Association of Consulting Engineers concerned with highways work undertake all aspects of consultancy in this field – from initial feasibility studies to the preparation of detailed designs and supervision of construction, followed by the task of maintenance.

The highly professional services ACE members provide are based not only on extensive experience and technical excellence, but also on integrity and total independence.

Engineering consultancy work on London's orbital motorway has been undertaken on behalf of the Department of Transport by:

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Tel: 01-636 1531

W.S. Atkins & Partners
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Ashley Road,
Epsom, Surrey KT18 5BW
Tel: 78 26140

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London W6 7BY
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Yeoman House,
63 Croydon Road,
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Tel: 01-778 6060

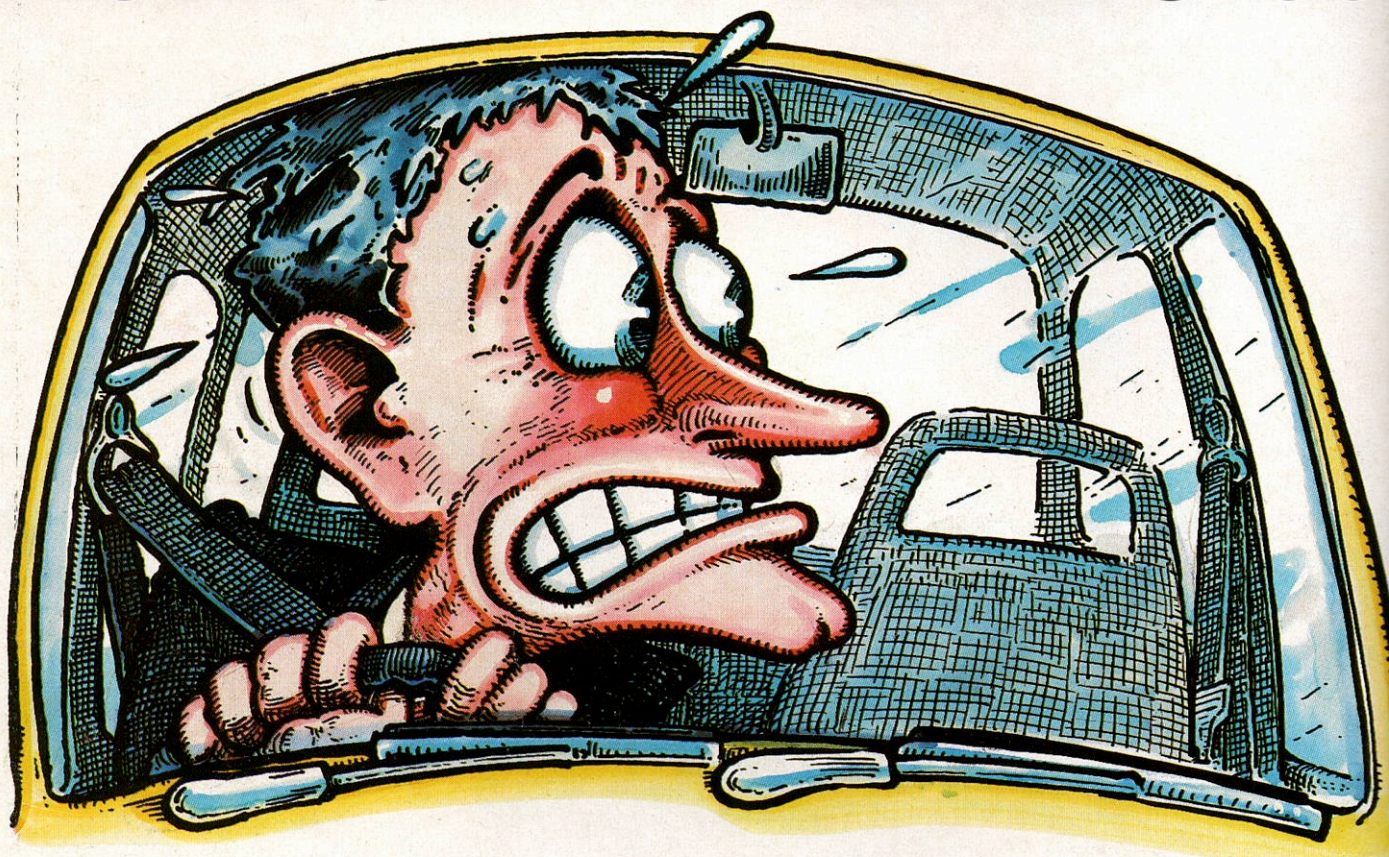
Mott, Hay & Anderson
20-26 Wellesley Road,
Croydon CR9 2UL
Tel: 01-686 5041

Enquiries about the Association or services available through its Members may be made to: **The Secretary, The Association of Consulting Engineers, Alliance House, 12 Caxton Street, London SW1H 0QL. Tel: 01-222 6557. Telex: 265871 MONREFG (quoting Ref 83: ICE001).**

Natural Beauty. Much of the road lies in cutting or false cutting, and this has gone a considerable way to hiding the road from the eyes and ears of residents and countryside users, though at the cost of making this stretch somewhat duller for the motorway user.

Measures to protect wildlife from the effects of the motorway include deer-proof fences on the Epping and other sections, deer and badger underpasses and other special underpasses to allow animals to follow their accustomed routes; and the retention and protection of special plant habitats identified by naturalists' trusts and the Nature Conservancy Council. As with older motorways, the grass verges of the M25 are already serving as invaluable reservoirs of wildlife.

Have you ever thou next car could be ste



You know how it is when you see someone on the phone in a car.

Who is he talking to? What is he talking about?

You can bet your shirt he's not passing the time of day chatting up his mother-in-law.

Nor is he sitting there boasting he's got one of those swanky new Cellphones.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them

No, the odds are he's stealing a march on one of his competitors. That frustrated fellow after the same piece of business as he is, also stuck in a traffic jam not getting anywhere fast.

You, perhaps?

There is only one way out of this unfortunate situation, and that is to get a Cellphone yourself.

Then you'll be too busy pulling off your own deals to worry what the chap in the next car's up to.

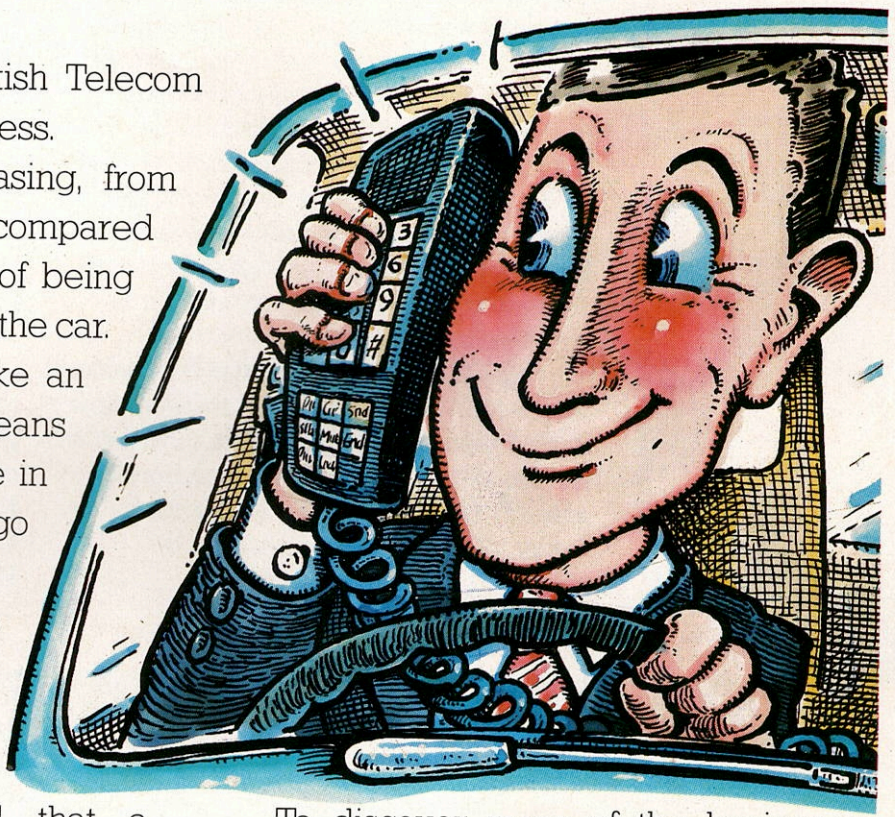
ght the man in the aling your business?

Buying, or leasing, a British Telecom Cellphone is particularly painless.

Prices start at £899* (leasing, from around 75p a day*). Not much compared to the immediate advantage of being able to carry on business from the car.

The system works just like an ordinary telephone, which means you can call almost anywhere in the world without having to go through an operator.

You can even 'store' up to thirty long international numbers for quick, safe two-digit dialling.



It has been calculated that a businessman travelling 25,000 miles a year spends on average five hundred hours in the car.**

That is the equivalent of sixty-two and a half eight hour days, or, put it another way, no less than twelve and a half forty hour working weeks.

No wonder so many are fitting and using a British Telecom Cellphone.

How much longer can you afford to be without one?

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*List price and approximate daily cost based on 5-year lease. (Excludes installation charges, standing charge for Cellnet system, call charges and V.A.T.) **At overall average speed of 50 mph.

ARCHAEOLOGY

The route of the motorway inevitably cut through a number of archaeological sites, some of them known before work began. The Department of Transport was anxious that there should be opportunities for "rescue archaeology" — the excavation and recording of remains and the removal of significant artefacts before development — and, within the constraints of timetable, archaeological resources and contractors' programmes, much of value was achieved.

The archaeological services of six counties — Kent, Surrey, Berkshire, Buckinghamshire, Hertfordshire and Essex — were involved, as well as the British Museum, Oxford University and local archaeological societies. Both professional and volunteer archaeologists made their contribution.

At Polhill on the Swanley–Sevenoaks section, for instance, Kent Archaeological Rescue Unit (KARU) was able to make further excavations into a Saxon burial ground discovered during earlier road works. A full-time team assisted by volunteers continued a series of investigations which carried out air sorties, field walking, trial trench-digging and large-scale investigation ahead of road works. Previous work had been done in advance of the building of the A21 and M20, though the original discovery of Saxon graves was made during the construction of the Sevenoaks Turnpike in 1839!

The latest discoveries make it clear that this cemetery, with well over 200 graves, is by far the largest Anglo-Saxon cemetery discovered anywhere in West Kent. The 1984 excavation lasted non-stop for 28 days with two site supervisors, Keith Parfitt and Peter Keller, sleeping on site to

protect it from intruders. They were assisted by four full-time and seven part-time members of the KARU team, some 40 volunteers and another 35 members of five local groups from Orpington to Dover. They removed several full skeletons, and the graves also yielded many small objects, such as iron knives, which are being studied. The Polhill excavations, directed by Brian Philp and Derek Garrod, were financed mainly by Kent County Council and Esso, assisted by local fund raising and other contributions. The KARU says it was greatly helped by the Resident Engineer in charge of the section, Mr Ian Watts. KARU members have investigated more than 50 miles of motorway and trunk road route since 1974. The Unit also found a Roman cremation cemetery, a medieval site and a Mesolithic site on the M25.

In Surrey and Berkshire, resources were not available to monitor the most recent road construction, but overall the most interesting finds were at Runnymede and Egham, where important Bronze Age settlements were excavated in advance of the motorway construction. The Runnymede site in particular is regarded as of prime importance and has been dated to around 800-670 BC. Surrey County Council archaeologist Dr David Bird cites as a measure of this the antler sets (horse bridle sets made from antler) found there. Before Runnymede was excavated an authority in that field described seven sets found thus far in Britain. Runnymede alone yielded around ten more.

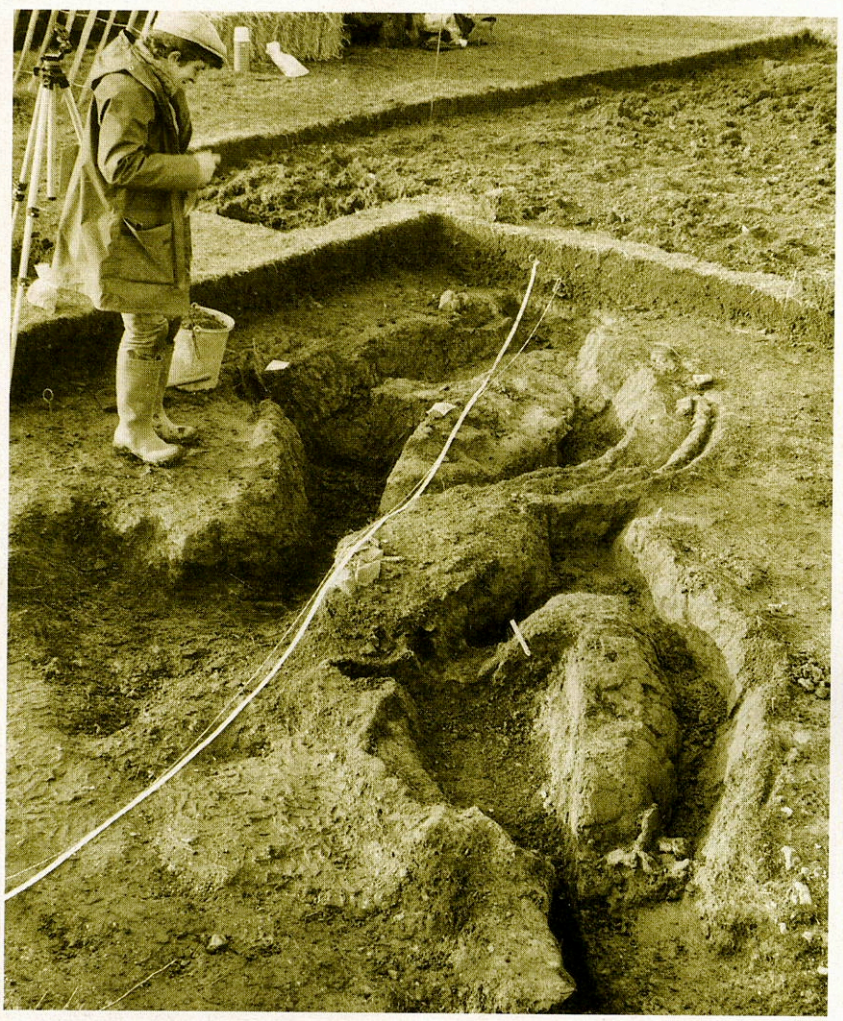
As well as bridle sets, remains of horses were also found. Dr Stuart Needham of the British Museum, who was brought in when the importance of the Runnymede and Egham finds became apparent, suggests that horse-riding may have been first introduced at this period.

Another significant discovery was a double row of piles stretching some 50 yards, which looks very like a river wharf and therefore suggests that this was a major trading settlement. These finds, together with pottery and bronze articles of similar date, will enable the archaeologists to extend significantly their understanding of the social and economic nature of Bronze Age society. There were also important Neolithic discoveries.

On the northern stretches of the Orbital the most interesting finds occurred in Buckinghamshire and Essex. In Buckinghamshire, notable discoveries were made at Iver at the M25/M40 interchange, and near the railway viaduct across the River Misbourne.

In the bed of the diverted Alderbourne, the archaeologists found a three-metre deep deposit of sediments including remains of insects and of pollen. These are now being studied at Oxford University, and will, says Buckinghamshire County Museum's field archaeologist Mike Farley, give a complete picture of the vegetation of the area from the end of the Ice Age to the present day. Other discoveries included first tools from a Mesolithic settlement of around 7000 BC and a wooden stake thought to be the oldest artefact ever salvaged in Buckinghamshire.

At the M25/M40 interchange they discovered a large quantity of pottery fragments — they rescued nearly a tonne, the products of medieval pottery kilns. The medieval potters were making cooking pots, jugs, bowls and curfews in a spot remote from any village, but convenient for good clay, wood and water. English Heritage's Ancient Monuments Laboratory carried out archaeo-magnetic tests on the kilns and showed they were in use about AD 1250.

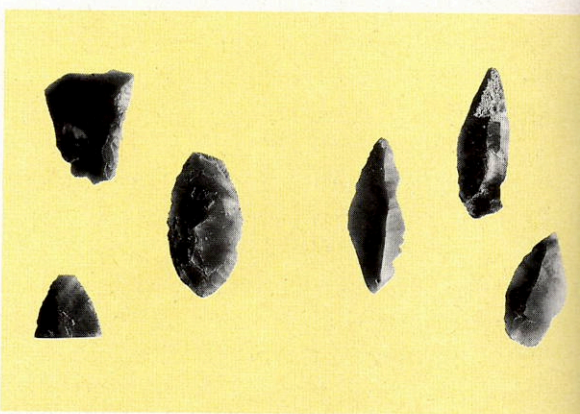


In Essex, county archaeologist John Hedges engaged an experienced freelance archaeologist, Tony Wilkinson of Lincoln, to carry out excavations on a stretch north of the Dartford Tunnel in late 1979. At Belhus Park near Aveley they found the remains of Iron Age settlements of around 700 BC; and in the system of enclosures and ditches, located in an aerial photograph of Belhus Park, they discovered a substantial quantity of pottery.

The area south of the Mar Dyke, where Wilkinson and his colleagues investigated the routes of both the M25 and the diverted A13, provides a graphic example of how road builders and archaeologists can help each other. The archaeologists knew that this area had dene holes — ancient tunnels mined in the chalk. The exact location of one of them became apparent when a contractor's JCB fell into it!

From their experience of such excavations, the archaeologists were able to tell the road engineers its likely direction and extent so that they could avoid further accidents and could stabilise the ground quickly and effectively. The archaeologists were also able to discover more about this particular set of dene holes (probably medieval); and elsewhere in the locality road building allowed them fresh insights into the ancient course of the Mar Dyke, at one time a brackish arm of the Thames.

The third important Buckinghamshire site could be examined only briefly because of the contractor's programme, but it produced evidence for a late Mesolithic settlement on the floor of the Misbourne Valley near Gerrards Cross. Flint tools and bones from animals long since disappeared from this country were found, including wild ox and wild pig. The Oxford University's Research Laboratory for Archaeology has radiocarbon-dated some of the bone to around 4500 BC.



Traffic control on the M25 uses some of the latest and most sophisticated electronic techniques.

The 117 miles (188 km) of the Orbital road are patrolled by police from six forces, but control of their vehicles on the M25 is concentrated on four control centres. A centre at Godstone in Surrey controls Kent and Surrey police operations on a section of the Orbital from the Dartford Tunnel to south of junction 12 (M3); Heston in West London oversees Metropolitan, Surrey and Thames Valley police operations from the M3 to junction 17 (A412); the stretch from there to junction 23 (A1(M)) is controlled by Hertfordshire police from a control centre at Welwyn; and the remainder of the Orbital is patrolled by Metropolitan and Essex forces supervised from an Essex control centre at Chigwell. The Dartford Tunnel has its own control system and control centre.

The Chigwell control centre will be the location for the M25's first microprocessor control system, which will cover the section from Waltham Cross to the M11/M25 interchange together with adjacent sections of the M11. This includes the Holmesdale and Bell Common Tunnels, where emergency telephones are at 40–50 m intervals instead of the usual 1–2 km, and where there are TV cameras and monitoring devices which provide warning if traffic comes to a halt or is moving slowly. The first system is expected to come into operation in spring 1987.

The Metropolitan Police control centre at Heston will also get a microprocessor control system — in this instance designed and manufactured by Ferranti. It will control the elevated section of the M4 and both the M4 and M25 near Heathrow Airport. It will be extended to the whole length of M25 from the M3 junction (J12) to Maple Cross in Hertfordshire (J17).

Contracts have now been let to provide the new control systems on all the M25 by the end of 1987. The whole of the M25 will then have signals, mounted either on posts or gantries, able to warn drivers of lane closures or of the need to slow down. It will have emergency telephones which, except in the tunnels, are at roughly 1,000 yard (1 km) intervals. Until this work is completed all of the motorway has temporary services in operation.

On the approaches to the Dartford Tunnel warning signs allow for advance warnings of delays, including "SLOW DOWN — QUEUE AHEAD" signs; a similar but more sophisticated system at the approaches to the Holmesdale and Bell Common Tunnels is to be provided to guide drivers onto a diversion route when the tunnels are closed for maintenance or other reasons. Other equipment includes fog monitoring devices on the low-lying Mole Valley section west of Leatherhead which warn the police of deteriorating weather conditions.

As well as monitoring the M25, police at the computer consoles may in ordinary circumstances be dealing mostly with other police work, including crime and traffic incidents off the motorway.

Routine requests for assistance from motorists broken down on the motorway come initially to the control room, which alerts motoring organisations or other breakdown services. About nine in ten calls concern breakdowns, perhaps one in ten is about other incidents ranging from debris on the motorway to serious accidents.

The total cost of signalling and telephone control equipment on the M25 is approximately £5.7 million and the work is expected to be complete in Autumn 1987.

SAFETY ON THE M25

Modern control systems can do much to make a motorway safer and to ensure that the emergency services respond quickly to any accident and minimise its consequences. But ultimately the safety of a driver on the M25, as on any motorway, depends to a large extent on sensible and careful driving.

The guidelines for safe driving on the M25 are much the same as for other motorways but, especially on the busier stretches, a safe driving discipline is, if possible, even more necessary. Traffic densities on some sections of the London Orbital are already higher than the motorway driver may usually encounter.

The first thing to remember is to allow plenty of time when you plan your journey. It is foolish to assume that you will be able to maintain an average speed of 70 mph. A moment's reflection tells you that just isn't possible without breaking the speed limit. Remember 70 mph is the maximum legal speed on a motorway just as it is on most other dual carriageways. Some vehicles, including heavy goods vehicles, are subject to lower limits.

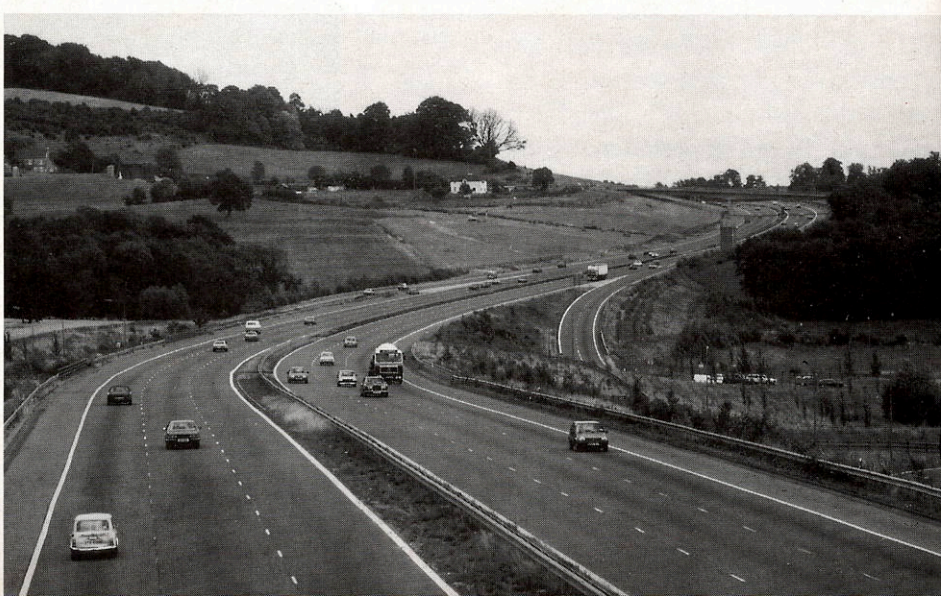
Make sure also that your vehicle is in good working order. Check your fuel, oil and water levels. Fast motorway driving can bring defects to a head in a way that other journeys may not.

Keep your distance. Check your mirror constantly, especially when changing speed or direction. Do not cut in front of other vehicles when you change lanes. When leaving the motorway, move into the nearside lane in good time before your exit point.

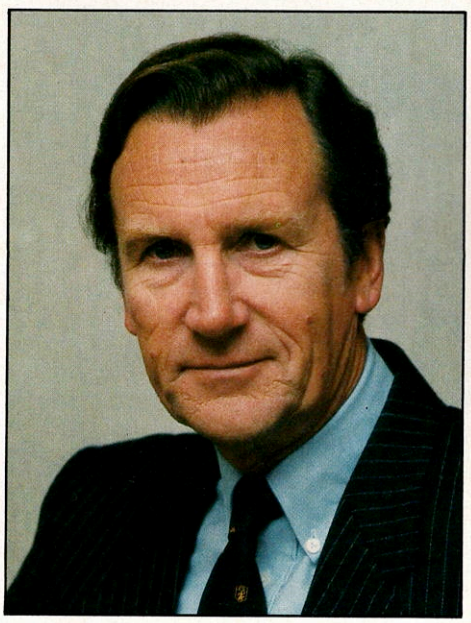
Use the nearest free lane to the hard shoulder. There is no "slow lane", "cruising lane" or "fast lane". Don't hog either the outside or the middle lanes; move over to the left whenever there is room to do so.

In bad visibility, and particularly if mist or fog are developing or forecast, slow down, keep your distance and switch on your dipped headlights. Your safety and the safety of others depends on you.

A special system of signing has been devised to help guide you onto and around the M25. The place names on the signs are based on five key destinations: Watford and M1, Heathrow and M4, Gatwick and M23, Harlow and M11, and Dartford Tunnel. Use the key destination to plan your journey and then follow the names on the signs to guide you onto the motorway heading in the right direction. When you leave the motorway, the signs show local places near the junction, as well as the junction number.



M25 FIRST SERVICE AREA

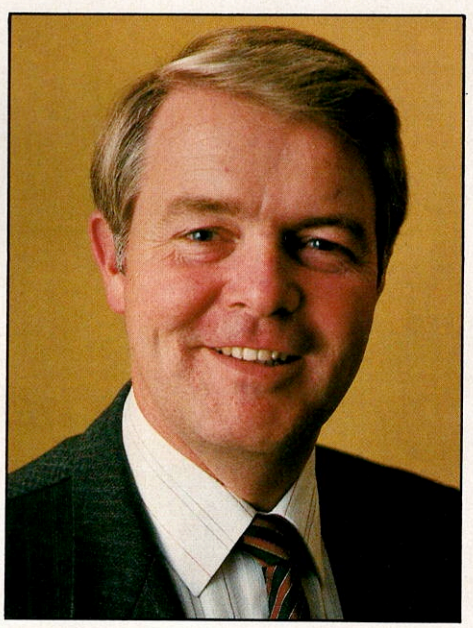


The M25 will help far more than just the capital it circles: industry and commerce throughout all of Britain will benefit from the new 117-mile communications link and all those involved in its development are to be congratulated.

The motorway's first service area, which BP has been building at South Mimms in Hertfordshire for the past 6 months, is of major importance and BP and Trusthouse Forte, our partners in the project, have invested much and worked hard to ensure that it can comfortably meet all the requirements of even the most demanding traveller.

When refuelling facilities are available later next month and the catering and other services are opened in March, South Mimms will be the most advanced motorway service area in Europe, reflecting the very best BP and Trusthouse Forte have to offer.

David Kendall
Managing Director
BP Oil Limited



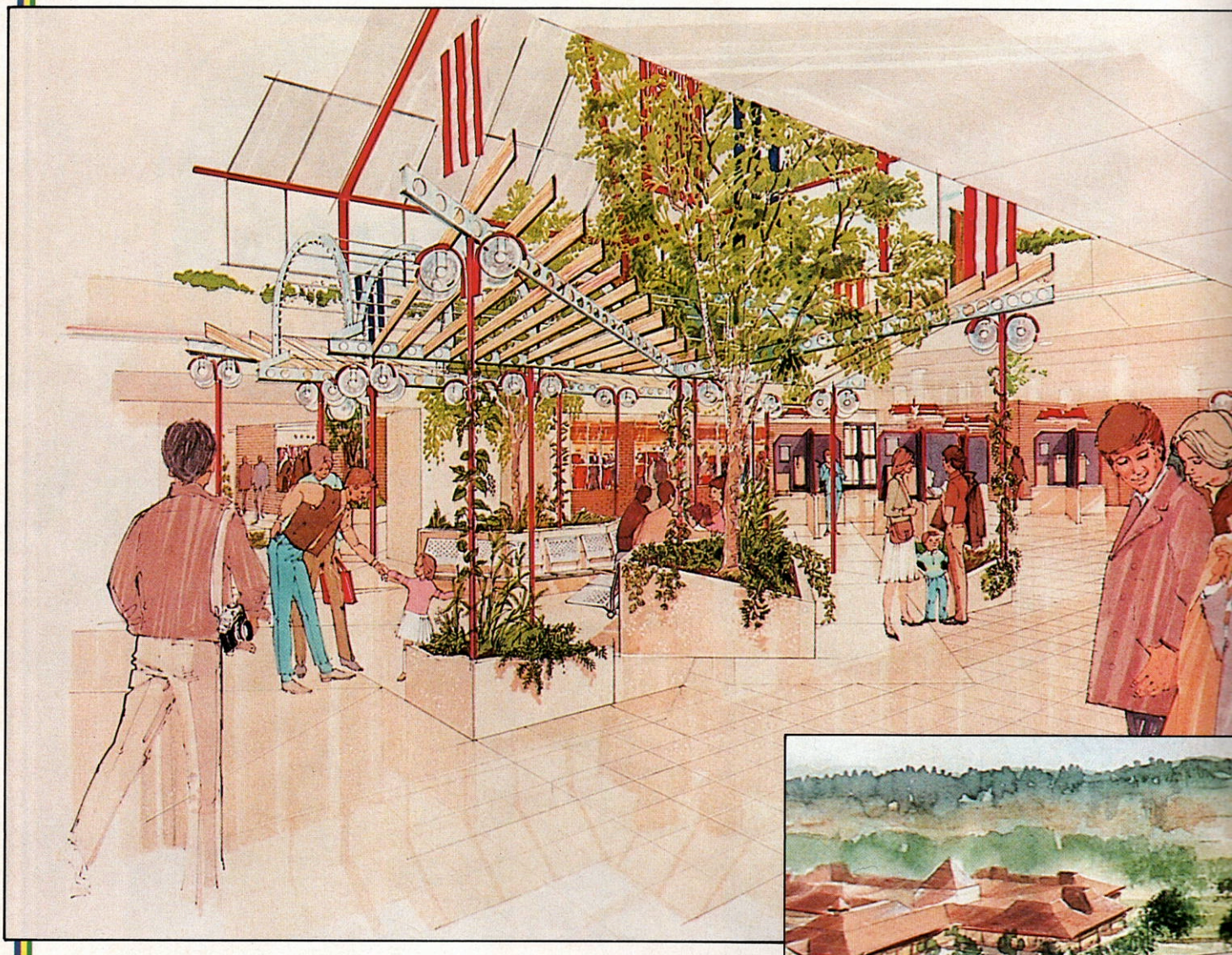
In thirty years, Britain's motorways have revolutionised domestic travel, yet are now so much part of our way of life that they are taken for granted, along with Motorway Service Areas. Soon this latest most significant link, the M25 London Orbital Motorway, will be taken for granted by travellers from home and abroad.

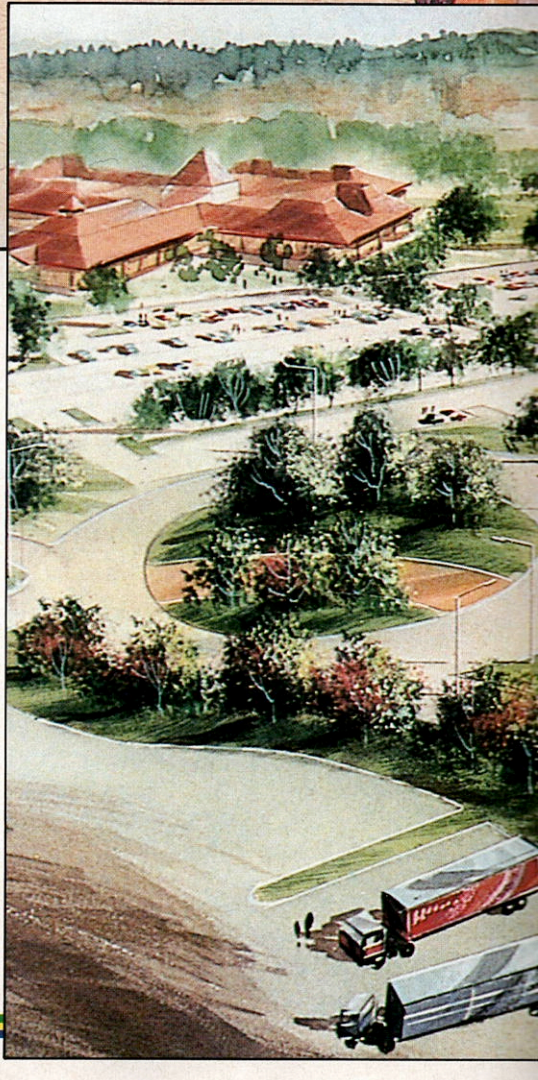
However, at this stage, it is perhaps worth reflecting on the fact that the design and construction of a modern Motorway Service Area used by millions of motorists of all types each year is a complex undertaking and the standards achieved at South Mimms owe much to the experience and expertise of both Trusthouse Forte and BP in this field.

Whatever the weather, 24 hours a day, South Mimms will provide a complete service, encompassing every conceivable traveller requirement on one site, with a blend of advanced technology and caring service.

Alan Hearn
Managing Director
Trusthouse Forte Catering

SERVICE COMES FIRST-C





The first service area on London's orbital M25 motorway is being jointly developed by BP Oil and Trusthouse Forte. Sited on 35 acres with 18 acres devoted to service facilities, it will be one of the largest, most modern and technically advanced motorway service areas in Europe. Forecourt facilities will be available towards the end of November 1986.

Sited at South Mimms, Hertfordshire, at the junction of the A1 (M) and the M25, the BP forecourt will feature 26 fuelling positions. offering petrol (including unleaded) and diesel to private motorists and light vans. Disabled drivers can use a special key-operated 'call' facility for services without aligting from their vehicle.

The layout of the site and appearance of the main building has been designed to blend in with and enhance the local environment, including a landscaped picnic and childrens play area.

When the final touches are completed in early 1987, the South Mimms motorway service area will have cost over £7,000,000 to develop and will have created over 250 new jobs. Virtually all staff will have been recruited locally.

Parking will be available for over 700 cars and 35 coaches, with extensive toilet facilities, including special provision for the disabled and parents with babies.

RS, LEISURE & BUSINESS

It is anticipated that some 10,000 to 12,000 vehicles will pass through the service area every day and that over 5 million people will use many of the various services available every year.

Trusthouse Forte will cater for all appetites – a special picnic centre for take-away cold fare, a fast-food restaurant for those quick hot snacks, and a special full menu self-service restaurant seating well over 400 people. All offering friendly service and value for money.

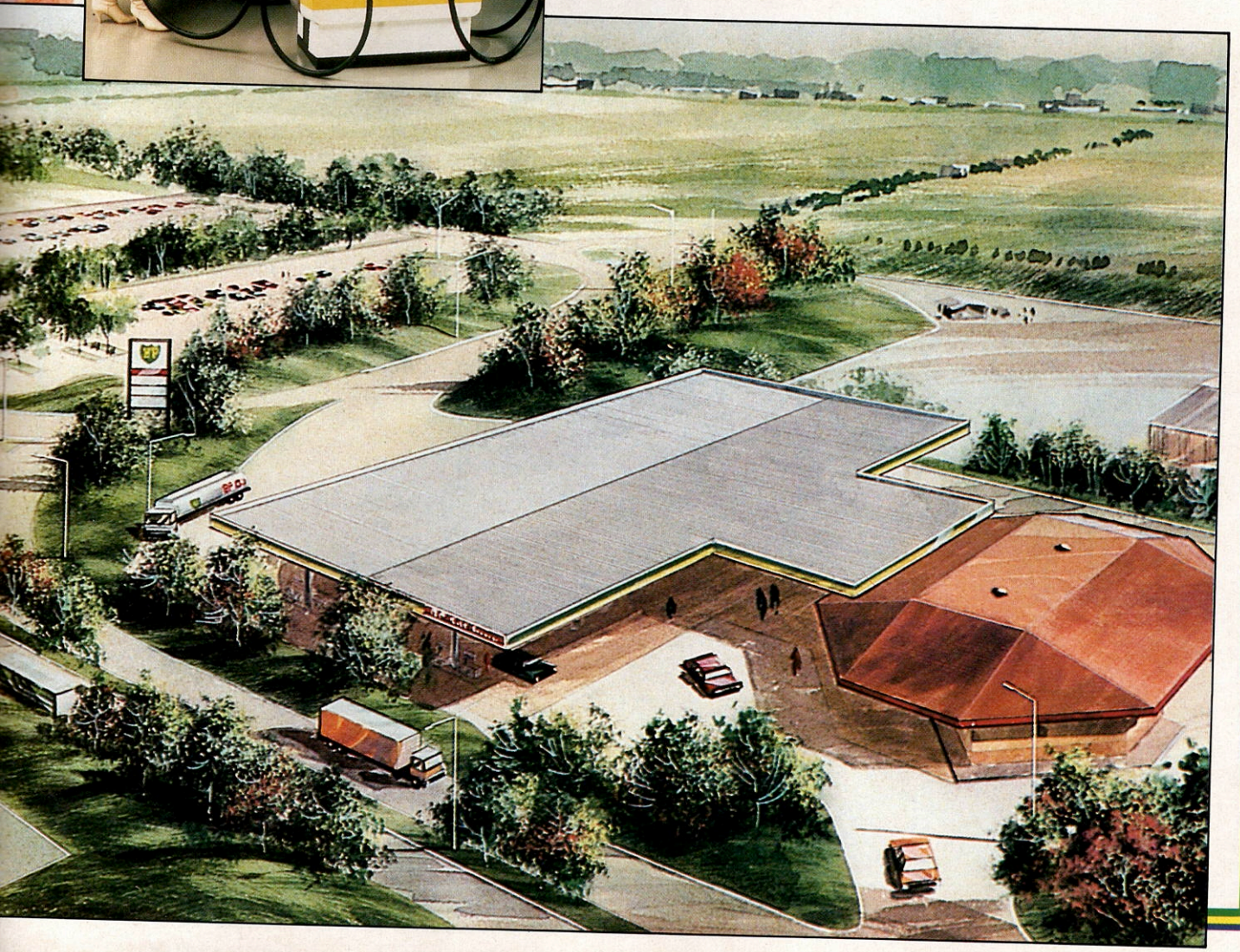
Shopping is designed to be a pleasure in this bright, cheerful and modern environment. The traveller requiring gifts or flowers, magazines or toys, car accessories or confectionery, video tapes or books will have their needs well met.

Of course, telephone facilities will be many, as will amusements to keep the kids entertained – in all weathers!

South Mimms will feature a unique business centre that could well become Britain's most famous 'Meeting Point'. For the busy business executive there will be secretarial facilities including audio/shorthand, photocopying, telex and facsimile.

Two special syndicate rooms will be available with both audio and visual aid facilities for those important meetings. Even a mobile telephone so the office can keep in touch.

Booking any of these facilities couldn't be easier with any of the Trusthouse Forte hotel establishments being able to take a computer booking on the spot.



Petrol prices are rarely out of the headlines but modern filling stations need much more than just price appeal to succeed. Today's motorist demands a whole range of services and facilities and will shop around to get them.

BP has about 2,000 filling stations located in cities and villages, on motorways and in country lanes, and each year spends £ millions developing and improving them to meet the differing needs of the motorist.

All are open for long hours and some never close at all. An increasing number have car washes and most have shops, some of which – like Food Plus – offer more "damn it, I forgot" items than many corner stores.

Few retail outlets provide more ways to pay for goods than a filling station. One of the latest involves electronic funds transfer which BP pioneered in the UK.

With more diesel cars on the road, BP has invested heavily to improve facilities for them and in June this year BP were at the forefront in introducing unleaded petrol, more than three years ahead of the time demanded by law.

BP's newest filling station will become the first to provide petrol for motorists on the M25. And as South Mimms services is BP's biggest single retail investment, you can be sure it will offer much more than just petrol at a competitive price.

South Mimms represents the latest in a long line of 'firsts' for the Trusthouse Forte Motorway business. From designing and operating the first ever Service Area on the then newly-opened M1 at Newport Pagnell in 1960, we have innovated and pioneered new and improved customer services for some 26 years. The outcome of this unrivalled experience and expertise is on display at South Mimms, the first service area on the M25.

1986 was a momentous year for the Trusthouse Forte Motorway business in other respects with two new Service Areas becoming fully operational at Sarn Park on the M4 and Sutton Scotney on the A34 and the acquisition of the four sites of the highly-respected Welcome Break chain.

1987 promises to be just as challenging with yet more Trusthouse Forte achievement, including the planning of the first M11 Service Area at Birchanger, the opening of the redeveloped site at Sedgemoor on the M5, and unprecedented levels of customers to be catered for with our Nationwide chain of superior sites.

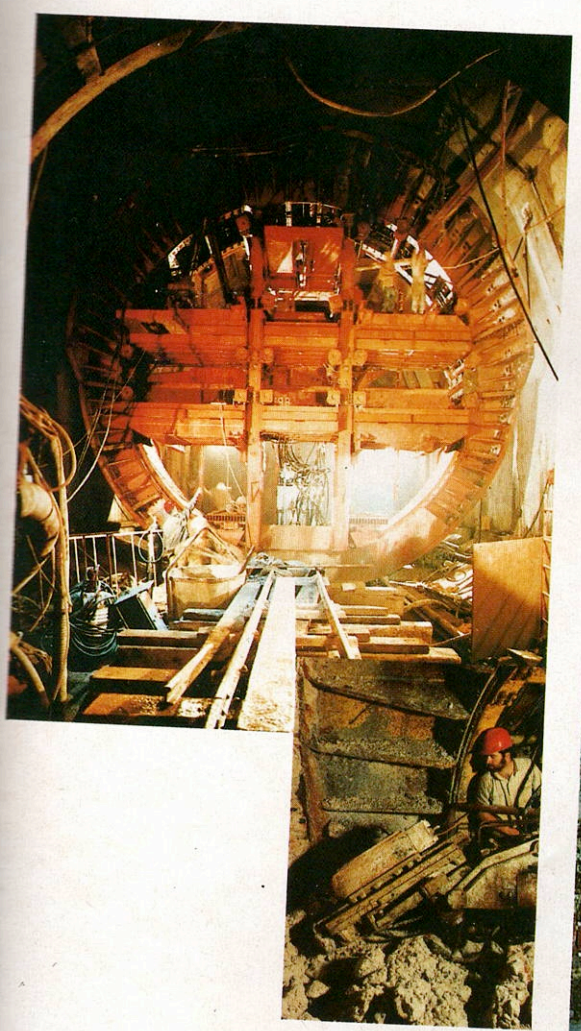
Further into the future this growth is predicted to continue and Trusthouse Forte aim to retain their position as Market Leader by continuing to offer our customers good value, excellent service, and a warm welcome.

IMPROVED THAMES CROSSING

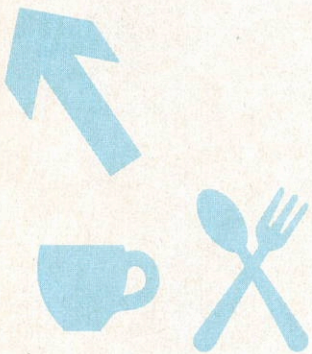
The heavy use already being made of the M25, and in particular of its north-east quadrant, led the Government to act to reinforce what could become a serious bottle-neck: the Dartford Tunnels.

These at present provide two lanes in each direction, and the Department of Transport has financed work by Kent and Essex County Councils (now almost complete) to improve their approaches and to double the number of toll booths from 12 to 24.

The Government is committed to the provision of a further crossing.



SERVICE AREAS



Present plans are for four motorway service areas (MSAs) on the M25. The proposed sites were determined by strategic traffic engineering and environmental considerations: most of the M25 is in the Metropolitan Green Belt.

The four are:

- South Mimms, Hertfordshire — under construction on a site adjoining the existing roundabout at junction 23 and with access from that roundabout. It is being built and operated by a consortium of BP, Welcome Break and Deards, a company which already operates lorry maintenance facilities there. This will be the first to open, and is expected to be in full use in 1987.

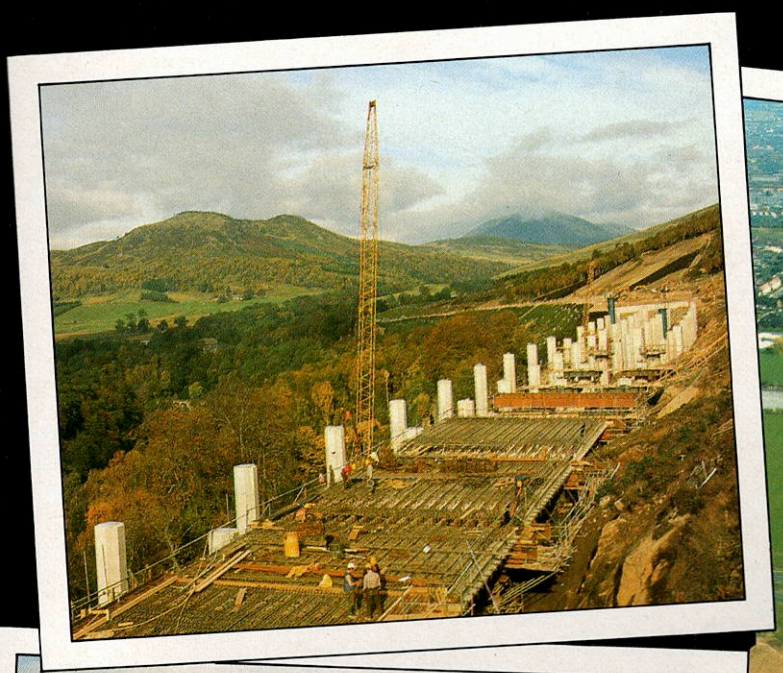
- Westerham, Kent — a site at Clacket Lane, between junctions 5 (M26/A21) and 6 (A22). It was the subject of a Public Inquiry last summer.

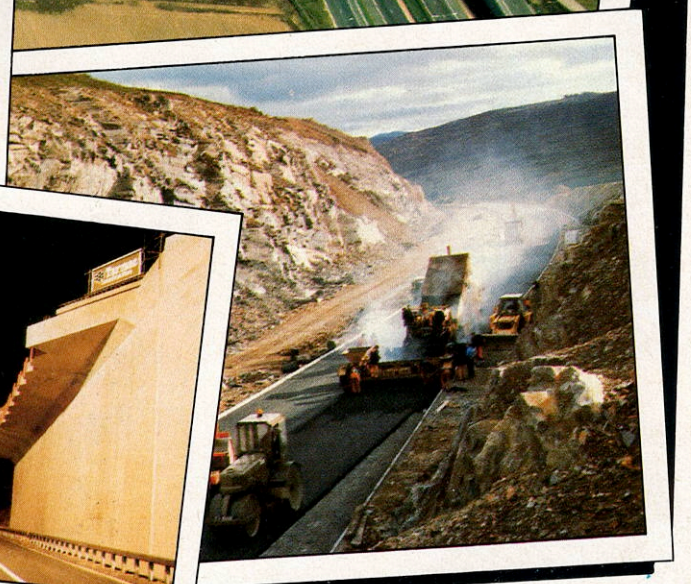
- Iver, Buckinghamshire — on a site between junctions 15 (M4) and 16 (M40), close to Iver British Rail station. A plan for a park-and-ride and MSA facilities is being appraised financially for the Department of Transport. Service area proposals were the subject of a Public Inquiry in summer 1986.

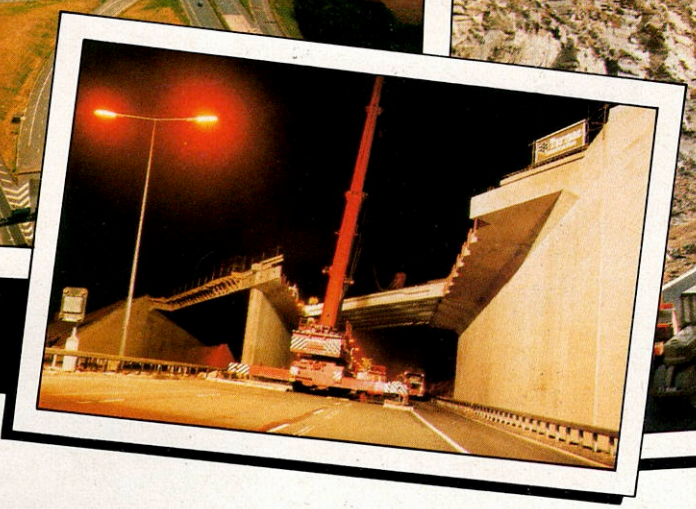
- Thurrock, Essex — a 40-acre site north east of junction 31 (A13, A1306), close to the Dartford Tunnel. Tenders to build and operate the service area were appraised by the Department in summer 1986.

The siting of these four MSAs is in line with the Department's policy of providing MSAs at roughly 30-mile intervals. Other planned service areas on radial motorways will complement existing provision on them and on the Orbital, including one at Birchanger on the M11 (near junction 8, the Stansted turn-off), one on the M4, where consultants have been appraising possible sites to fill what is at present a 56-mile gap on that motorway, and at Stokenchurch on M40 and Hollingbourne on M20.

LEADERS...







Tarmac Construction

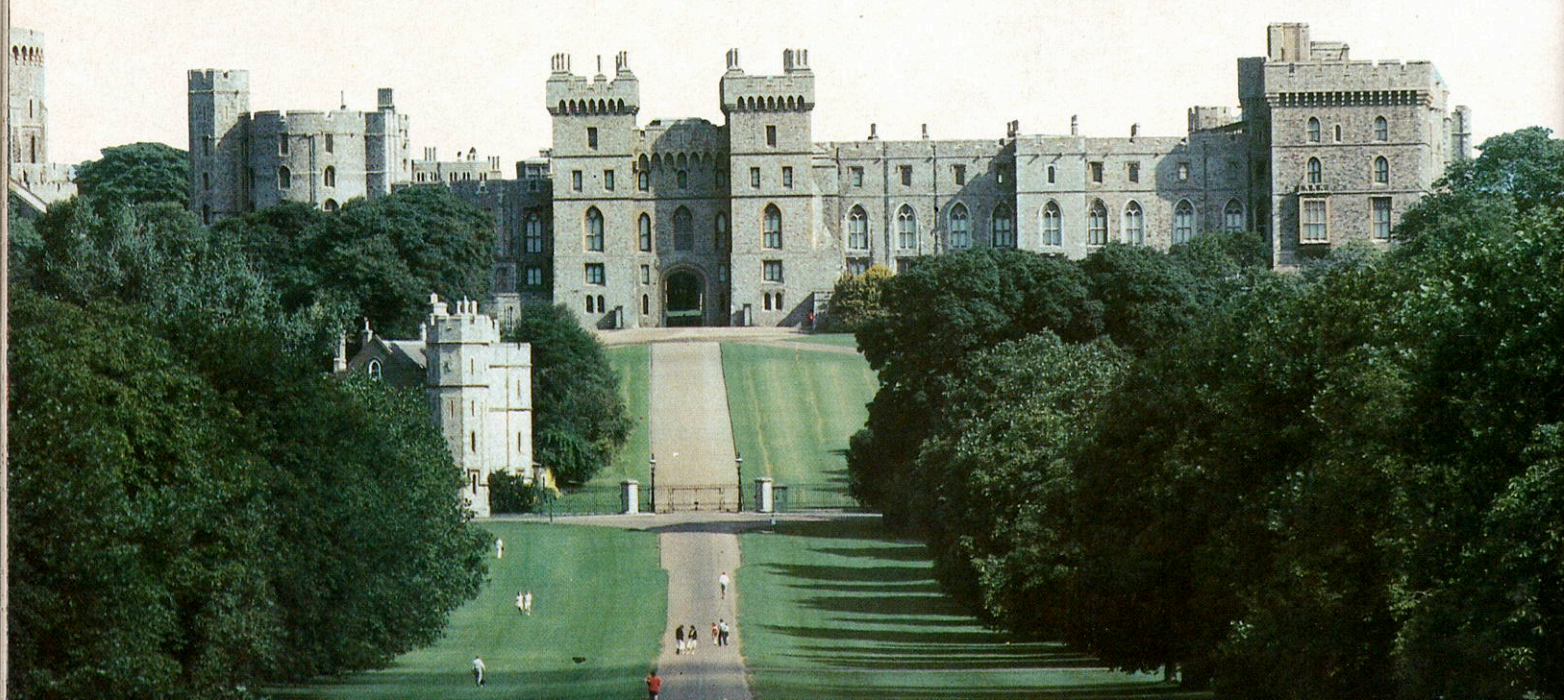
CONSTRUCTION AT ITS BEST

Tarmac Construction, Construction House, Wolverhampton WV1 4HY
Telephone: (0902) 22431 Telex: 336057

TRAFFIC LEVELS

The M25 is — as was expected — proving to be Britain's busiest motorway. Traffic levels on the eight-lane western section near Heathrow had reached a daily average flow of some 106,000 vehicles per day by June 1986 and on the north-eastern section (junction 24 to 29) some 68,000 vehicles per day.

There has been peak-hour congestion between junctions 10 and 13. A study set up to look at this has already resulted in work to change lane markings aimed at improving traffic flow through three of the junctions. There is room in the central reserve to add a fourth lane between junctions 11 and 13 and consultants are considering how this work could be carried out with minimum disruption to traffic.



Most of the M25 is blacktop.

Shell Bitumen has been used in the construction of more than 50 miles of the total 121 miles that the M25 covers. That's a greater proportion than all other bitumens combined, and greater than the total surface laid to other materials.

As the M25 is destined to carry a heavier traffic load than any other motorway in Britain, it demonstrates a lot of confidence in our product.

We'd like to thank the contractors who chose Shell Bitumen: Associated Asphalt, French Kier, W.C.French, London Roadstone, Redland Aggregates and Wimpey Asphalt, and to assure them and all our other customers throughout the UK, that we intend to maintain our leadership in bitumen by providing the best service, the best products, and the best technical support.

AND MOST OF THE BLACKTOP WAS LAID WITH SHELL BITUMEN

Shell Bitumen

Shell Bitumen UK, Riversdell House, Guildford Street, Chertsey, Surrey, KT16 9AU. Telephone Chertsey (09328) 68211. Telex: 9419484 Shebit G.

Service beyond the call on the M25.

RAC

Service beyond the call.

AN AID TO TOURISM

One significant factor is the extent to which the existence of the Orbital is generating new trips as well as diverting those which would have been made by other routes. The importance of this for tourism should not be underestimated. The M25 is already helping to spread tourist traffic to attractions which previously suffered from relatively poor accessibility.

For tourists, the English Tourist Board regards the M25 as the most valuable road built in Britain for more than a decade. Much of the tourist authorities' energies over the past decade or two have been spent in trying to spread the economic benefits of tourism to places outside London and such "honeypots" as Stratford-upon-Avon and Edinburgh. The M25 assists this effort by giving the tourist — whether arriving by air at Heathrow or Gatwick or by sea at the Channel ports, whether by car or coach — the option of avoiding London and easily joining one of the radial routes to north, west, east, or south.

From a regional point of view, also, the M25 is a valuable tourist asset. The map on the inside back cover shows a selection of tourist destinations which may often be more easily reached by the M25 than by driving through London. They include a varied range of attractions such as country parks, gardens, sporting venues, historic buildings and museums. The map also shows how car-borne tourists can park-and-ride to Central London attractions by Underground or British Rail.

The Ordnance Survey (OS), Britain's national mapping organisation, provided the maps used to plan and design the M25 and has been continuously updating its basic maps as each section of the Orbital reached completion. It also produced a special M25 Map with motoring and tourist information to coincide with the motorway's completion.

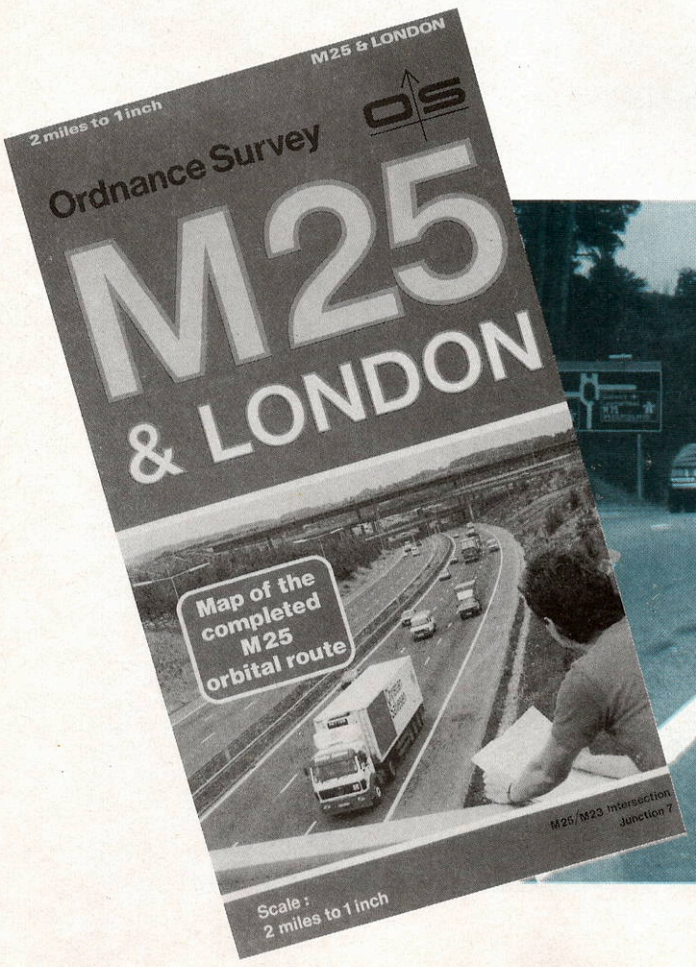
The whole of the route was already covered by OS basic maps at scales of 50 inches to 1 mile (1:1250) for urban areas and 25 inches to 1 mile (1:2500) for rural areas. The Orbital's designers used these to help them select and plan the routes, carrying out their own surveys as well to design the detailed layouts. But as the Orbital took shape on the ground, these basic maps and the smaller scale OS maps derived from them required updating. This demanded careful timing: the optimum moment to re-survey terrain altered by the motorway was as construction of each section reached completion but *before it opened to traffic*.

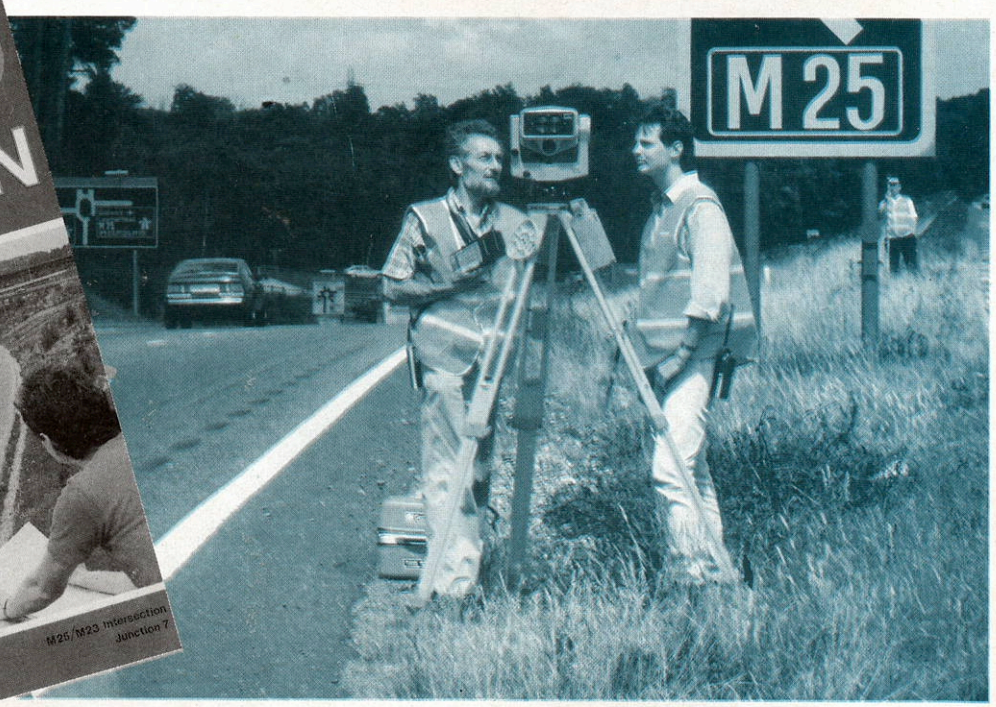
The Ordnance surveyors used two methods: aerial photography, and ground surveys using sophisticated electronic measuring equipment. As each section of the Orbital opened, the OS had revised large-scale maps ready for sale to the public.

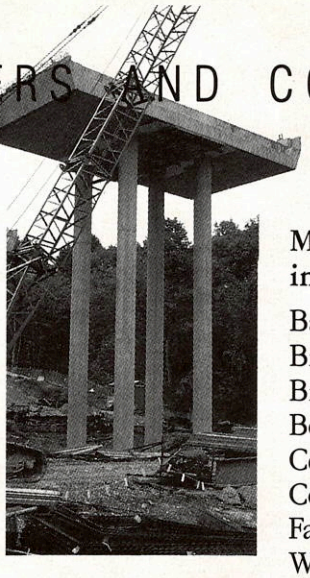
The OS's special M25 Map is at a scale of 3 inches to 1 mile (1:19000). It covers an area from Wokingham in the west to Gillingham in the east and from Luton in the north to East Grinstead in the south, shows the Orbital and connecting motorways and other roads (colour-coded by class) with clear details of junctions and the connections they provide.

Unusually for the OS, it has a grid reference system which, while based on national grid squares, uses a simple alpha-numerical system to plot locations (square A6, F12 and so on). It also shows distances between junctions and other key points.

Additional information on the new map includes useful details about the region's four main airports, Heathrow, Gatwick, Luton and Stansted, including access, car parks, terminal buildings and tourist information shown by keyed symbols. It also has an inset showing the main highway system for the whole of south-east and central southern England.





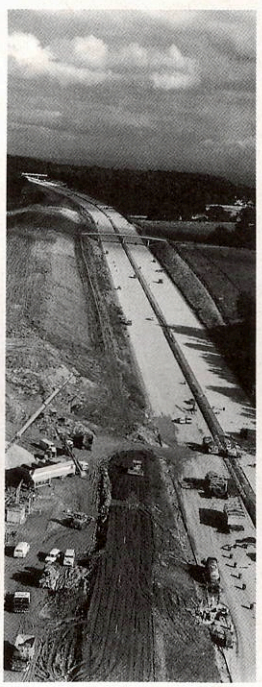


Engineers responsible for the design and supervision of the building of the M25 included:

Eastern Road Construction Unit (ERCU)
- Essex Sub-Unit
- Hertfordshire Sub-Unit
- Buckinghamshire Sub-Unit

South-Eastern Road Construction Unit (SERCU)
- Surrey Sub-Unit
- Kent Sub-Unit

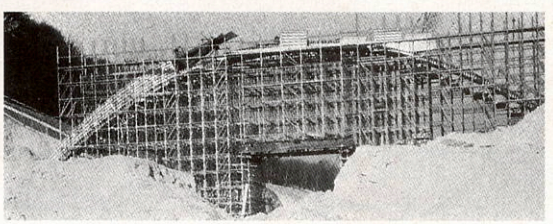
Ove Arup & Partners
W. S. Atkins & Partners
Brian Colquhoun & Partners
Sir William Halcrow & Partners
Gifford & Partners
Greater London Council
Kent County Council
G. Maunsell & Partners
Mott Hay & Anderson
Mott Hay & Anderson Electrical and Mechanical Services

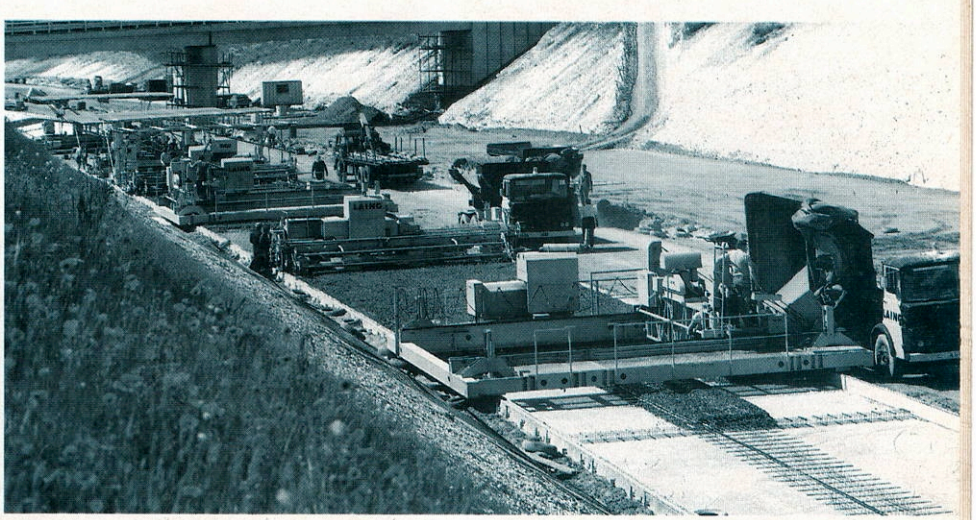


Main civil engineering contractors included:

Balfour Beatty
Birse
Birse-Farr
Bovis
Cementation
Costain
Fairclough
W & C French
Gleeson
Laing
Monk
Sir Alfred McAlpine
Edmund Nuttall
Tarmac
Wimpey

Main electrical and mechanical contractors included:
Haden Electrical
Matthew Hall Mechanical and Electrical Engineers

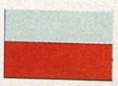




CONTRACT LENGTHS

CLOCKWISE FROM THE THAMES (DARTFORD TUNNEL)

Approx Junction Nos.	From	To	Miles	Km	Connects with	Main features	No. of Bridges etc.	Engineer	Contractor	Tender price (£m)	Start of works	Road open
1	A282, Dartford Tunnel Southern Approach		1.6	2.5	A296	New toll plaza under construction: 24 toll booths instead of 12. Widening of approach roads	—	Kent CC	Laing GEC	3.8 0.95	—	—
	(Operated by the Dartford Tunnel Joint Committee for Kent & Essex CCs)						—	Kent CC	Birse	11.1	Jan 85	Sep 86
2–3	Dartford	Swanley	3.3	5.3	A2 A20/M20	Two three-level junctions	10	SERCU (Kent SU)	Laing	5.5	June 74	Apr 77
3–4–5	Swanley	Sevenoaks	8.1	12.9	(A224) (A21)	Spectacular bridleway bridge at Polhill: 20 m high, 84 m span, two hinged arch. Earth-mounding to screen road on Polhill as seen from Otford	23	Kent CC	Laing	38.5	Jan 84	Feb 86
5	Sevenoaks interchange		0.9	1.5	(M26) (A21)	Low-lying, free-flow interchange; limited connections. Four-span viaduct connecting Chevening and Chipstead villages	6	SERCU (Kent SU)	Cementation	7.2	Oct 77	Jul 80
	Sundridge	Westerham	3.9	6.3		Motorway on gault clay at foot of North Downs escarpment	8	SERCU (Kent SU)	Gleeson	6.3	Jan 77	Nov 79
6	Westerham	Godstone	5.1	8.1	A22	ditto	13	SERCU (Surrey SU)	Bovis	8.4	Sept 76	Nov 79
6–7–8	Godstone	Reigate	4.5	7.2	M23	Four-level, free-flow interchange includes 1.5 miles of M23, which flies over at highest level on five 180 ft spans. Two advance contracts to carry railways over M25.	20	SERCU (Surrey SU)	French	10.4	Mar 72	Feb 76
					A217	Two-level junction						
8	Reigate	Leather-head	4.5	7.2		M25 at its highest point, some 700 ft above sea level near Reigate Hill	11	W. S. Atkins	Birse-Farr	14.6	May 83	Oct 85
9	Leatherhead interchange		2.8	4.4	A24 A243	Elongated double junction to fit into narrow gap, between Leatherhead and Ashtead. Earth-mounding and planting. Leatherhead bypass, built in same contract (cost shared with Surrey CC) forms part of interchange	15	W. S. Atkins	Balfour Beatty	14.3	Jul 82	Oct 85
9	Leather-head	Wisley	4.3	6.9		180 m long, eight-span viaduct over M25 and River Mole at Stoke D'Abernon.	12	W. S. Atkins	Fairclough	16.0	Nov 82	Oct 85
						Land bought to replace common land taken for road near Wisley	3	Advance contract W. S. Atkins	Fairclough	1.2		
10–11	Wisley	Chertsey	5.9	9.4	A3	New Haw viaduct (285 m, eight spans) carries M25 over River Wey Navigation and BR main line	10	W. S. Atkins	Balfour Beatty	20.7	Sep 81	Dec 83
								Advance contracts:				
							3 Bridges	1. SERCU (Surrey SU)	Fairclough	1.1		
							Viaduct	2. Gifford	Balfour Beatty	3.7		
							2 Bridges	3. SERCU (Surrey SU)	Monk	1.6		

CARS / VANS / TRUCKS BUSES / TRACTORS / CRAWLER TRACTORS / COMBINES
GRAPE HARVESTERS 4-WHEEL DRIVE TRACTORS / WHEELED LOADERS
FORAGE HARVESTING MACHINERY / BULLDOZERS / CRAWLER LOADERS / BACK LOADERS
GRADERS PIPE LAYERS/PIPE WELDERS/WHEELED HYDRAULIC EXCAVATORS
SCARPERS CRAWLER HYDRAULIC EXCAVATORS/THREAD WELDING ROBOTS
SPECIAL PURPOSE CONSTRUCTION MACHINES ROBOTISED WELDING ISLANDS
FIRE ENGINES/AUTOMOTIVE DIESEL ENGINES MARINE DIESEL ENGINES
STATIONARY DIESEL ENGINES/INDUSTRIAL DIESEL ENGINES/FORK LIFT TRUCKS
LUBRICATING OILS/PLASTICS CABLES/HOSES/TYRES/CARBURETTORS
WATER TREATMENT EQUIPMENT FUEL INJECTION EQUIPMENT / SPARK PLUGS
LOCKS/BATTERIES/BRAKING SYSTEMS/EXHAUST SYSTEMS/OIL FILTERS/AIR FILTERS
BUMPERS TACHOMETERS/GASKETS/SPEEDOMETERS/OIL PRESSURE GAUGES
PISTONS WATER TEMPERATURE GAUGES FUEL GAUGES/HEADLIGHTS
TAIL-LIGHTS ALTERNATORS/PISTON RINGS/FUSES MANUAL GEARBOXES
AUTOMATIC TRANSMISSIONS/OIL SEALS/ELECTRIC FANS/BOOST GAUGES
BRAKE LININGS/BRAKE DISCS CLUTCH PLATES/INDICATOR UNITS
REAR VIEW MIRRORS/WHEELS WHEEL TRIMS/WINDSCREEN WIPERS
HYDRAULIC SYSTEMS/VALVE SPRINGS/DOOR SEALS CYLINDER HEADS
CAR ACCESSORIES/HOT AND COLD STEEL FORMED PARTS IRON CASTINGS
LIGHT ALLOY CASTINGS/ALUMINIUM CASTINGS/NUTS/BOLTS/MECHANICAL COMPONENTS
CAST IRON ENGINE BLOCKS  AEROSPACE COMPONENTS/MARINE GAS TURBINES
AVIATION GAS TURBINES HELICOPTER COMPONENTS/HYDRO-ELECTRIC PLANTS
LIQUID OXYGEN TURBO PUMPS/AUXILIARY AVIATION TURBINES/FLIGHT DECK INSTRUMENTATION
POWER GENERATION GAS TURBINES NUCLEAR POWER GENERATION COMPONENTS
ARTIFICIAL HEART VALVES ARTIFICIAL PERICARDIAL AORTIC VALVES
CAPILLARY DIALYSIS FILTERS/VIRAL HEPATITIS TYPE B INDICATOR KITS
TUMOUR INDICATOR MEASUREMENT KITS/ANTITUMOUR MONOCLONAL ANTIBODIES
GENETICAL SONAR DIAGNOSTIC KITS/MILITARY COMMUNICATIONS SYSTEMS
PUBLIC COMMUNICATIONS NETWORKS/CIVIL DEFENCE COMMUNICATIONS/LAND RECLAMATION

LAST YEAR WE BUILT 3 DAMS, 7,000 CONSTRUCTION MACHINES, 20,000 ARTIFICIAL CARDIAC VALVES, 52,000 PACEMAKERS, 81,000 AGRICULTURAL TRACTORS, 100,000 COMMERCIAL VEHICLES, 258,000 AUTOMOTIVE DIESEL ENGINES, 3.5 MILLION BATTERIES AND 4 MILLION REFRIGERATOR COMPRESSORS – AS WELL AS 1.85 MILLION CARS.

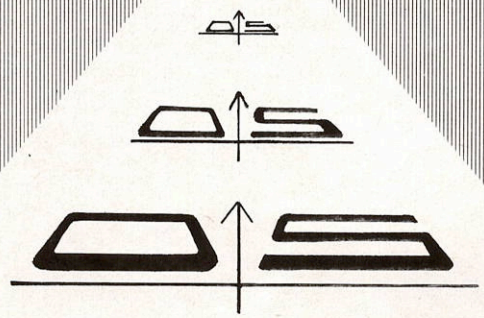
MOTORWAYS BRIDGES / AIRPORTS
VIADUCTS RAILWAY SYSTEMS
UNDERGROUND SYSTEMS/GAS PIPELINES
WATER PIPELINES/SEWER SYSTEMS/DAMS
DOCKS/WATER SYSTEMS/ROADS
TRAINS/URBAN TRANSPORT RAILCARS
DIESEL-ELECTRIC LOCOMOTIVES/RAILCARS
DIESEL LOCOMOTIVES/ELECTRIC LOCOMOTIVES
TILTING BODY ELECTRIC TRAINS
CARRIAGES/GOODS VANS/BOGIES
CONTAINERS/HOTELS/HOUSES/QUARRIES
HOSPITALS/NEWSPAPERS/BOOKS/TOURISM
TECHNICAL JOURNALS/COMPRESSORS

AND YOU THOUGHT WE WERE ONLY EUROPE'S LEADING CAR MANUFACTURER.

FIAT

SETTING NEW STANDARDS

ORDNANCE SURVEY New M25 Map



Based on the latest Routemaster mapping enlarged to 2 miles to 1 inch scale, this map offers accuracy at a budget price of £2·00. It is combined with an alpha-numeric referencing system and a gazetteer of place names.

Motorway links to the M 25, and through routes into and out of London are particularly well shown. Carefully chosen special features include inset maps of Heathrow, Gatwick, Luton and Stansted Airports. These provide the traveller with clear and up to date information about an often confusing road and air terminal network. Additional features are a location map of South and South East England, and a map of the London Underground.

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CONTRACT LENGTHS

CLOCKWISE FROM THE THAMES (DARTFORD TUNNEL) continued

Approx Junction Nos.	From	To	Miles	Km	Connects with	Main features	No. of Bridges etc.	Engineer	Contractor	Tender price (£m)	Start of works	Road open
11–12	Chertsey	Thorpe	2.4	3.8	A320 M3	Two-span skew suspension bridge (BR designed) carries railway over M25; its towers rise 30 m above carriageway.	8	SERCU (Surrey SU)	Bovis	7.6	Jul 78	Oct 80
						Multi-level free-flow interchange with M3.	1	Advance contracts: BR/ Stressed Concrete Design	RDL Contracting Ltd.	1.0		
11–12	Thorpe	Egham	2.5	4.0	—	M25 climbs on to embankment 7 m high to cross River Thames. Earth-mounding to protect Thorpe village from noise.	15	SERCU (Surrey SU)	Bovis/ Fairclough	9.9	Aug 74	Dec 76
13	Egham	Yeoveney	0.9	1.5	A30	Runnymede Bridge, 138 m long, designed to be sympathetic to existing Lutyens bridge (built circa 1960)	9	SERCU (Surrey SU) Ove Arup	Bovis Fairclough (advanced contract)	6.4 1.7	Feb 79 July 77	Nov 81 Mar 80
14	Yeoveney	Poyle	2.0	3.2	A3113	Incl. airport spur link with Heathrow Terminal 4	7	SERCU (Surrey SU)	Balfour Beatty	14.8	Oct 80	Aug 82
15	Poyle	Thorney Mill	2.1	3.3	M4	Four-level free-flow interchange with substantial landscaping: 3.5 cu m. of material brought in; 11 subsidiary bridges and other structures	17	W. S. Atkins	Cementation Construction	44.5	Apr 83	Sep 85 (M25) Dec 85 (J15)
15–16	Thorney Mill	Iver Heath	4.3	6.8		Structural platform over asbestos tip	13	ERCU (Bucks SU) Halcrow	Wimpey	25.3	Apr 83	Sep 85
16	M40 interchange		1.6	2.6	M40	Two-level junction with links and loops, kept low to reduce impact on Alderboure Valley	8	ERCU (Bucks SU) Halcrow	Tarmac	21.1	Jul 82	Jan 85 (part) Sep 85 (remainder)
16–17	M40	Maple Cross	4.8	7.7	A412	Motorway runs under arches of early 1900s railway viaduct across Misbourne Valley	14	ERCU (Bucks SU) Halcrow	Laing	20.0	Jan 83	Jan 85
17–19	Maple Cross	Hunton Bridge	6.0	9.6	A404	Includes Hunton Bridge spur	16	ERCU	Costain	5.8	Oct 73	Feb 76
19–20	Micklefield Green	Bedmond Road	3.6	5.8	A41	Viaduct 440 m long, crossing Gade Valley with Grand Union Canal, stream, road, and main line railway	9	ERCU (Herts SU) Colquhoun	Sir A. McAlpine/ Fairclough Consortium	26.8	June 84	Aut 86
20–21A	Bedmond Road	Bricket Wood	1.9	3.0	M1 A405	Four-level interchange with M1; link roads at top level to minimise impact; 130,000 trees and shrubs planted. Also caters for some movements between M1 and M25	14	ERCU (Herts SU) Colquhoun	Balfour Beatty	17.7	Mar 84	Aut 86
21A–22	Bricket Wood	London Colney	4.2	6.7	A405 A6	Passes under two railway lines and former gravel workings consolidated by dynamic compaction	10	ERCU (Herts SU) Colquhoun	Edmund Nuttall	15.2	Nov 84	Aut 86
22–23	London Colney	South Mimms	3.8	6.1	A6 A1(M)	Two-level interchange with A6; then follows historic route engineered by Thomas Telford in early 19th Century	8	ERCU (Herts SU) Colquhoun	Balfour Beatty	21.5	Jul 84	Aut 86
23–24	South Mimms	Potters Bar	2.7	4.3	A1(M) A111	Three-level junction: M25 over enlarged roundabout over A1(M)	7	ERCU	Balfour Beatty	4.9	May 73	Sep 75
24–25	Potters Bar	Waltham Cross	5.3	8.5	A10	Runs north of Enfield Chase; crosses London–Hertford rail line at Crew's Hill	15	GLC	Sir A. McAlpine	15.8	Jun 79	Jun 81

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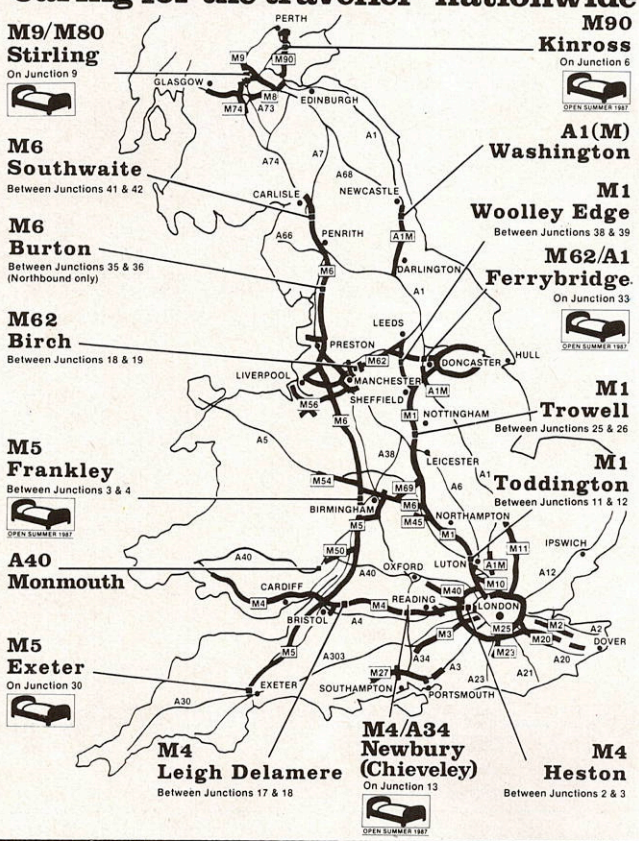

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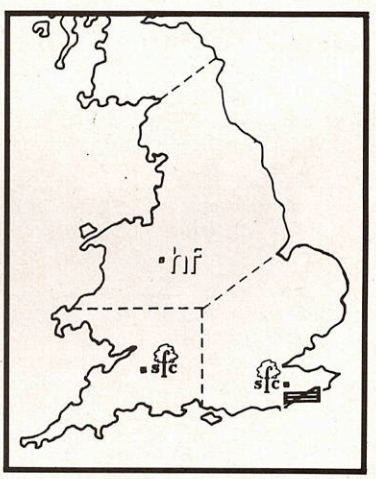

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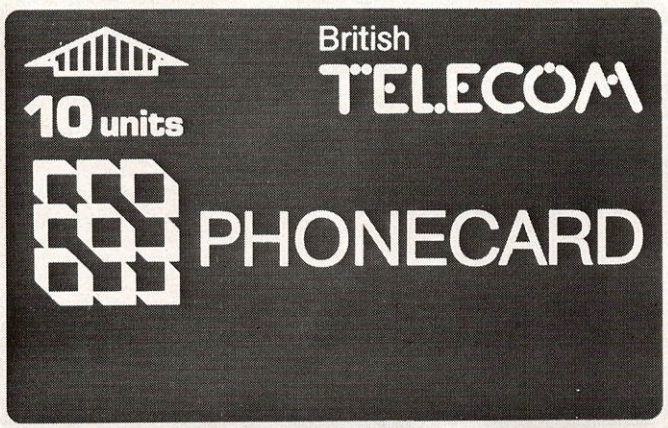
CONTRACT LENGTHS

CLOCKWISE FROM THE THAMES (DARTFORD TUNNEL) continued

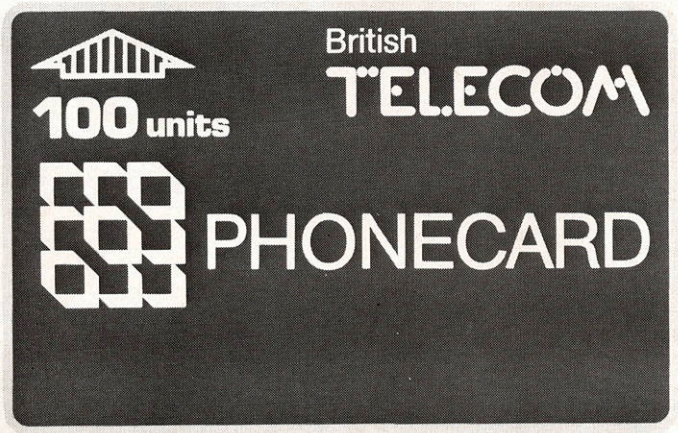
Approx Junction Nos.	From	To	Miles	Km	Connects with	Main features	No. of Bridges etc.	Engineer	Contractor	Tender price (£m)	Start of works	Road open
25–26	Waltham Cross	River Lee Navigation	1.8	2.9	A10	650 m cut-and-cover tunnel at Holmesdale Bridge over diverted River Lee Navigation	3	ERCU (Essex SU)/ Maunsell	Tarmac	28.6	Sep 80	Jan 84
	River Lee	Upshire	2.0	3.2	A121	Fringes of Epping Forest	5	ERCU (Essex SU)/ Maunsell	Tarmac	13.1	Jul 81	Jan 84
26–27	Upshire	Theydon Garnon	4.1	6.6		470 m tunnel under Bell Common (Epping Forest)	8	ERCU (Essex SU)/ Maunsell	Laing	29.1	Jun 81	Jan 84
27–28	Theydon Garnon	Passingford Bridge	2.9	4.6	M11	Complex two-level interchange with M11	15	ERCU (Essex SU)/ W. S. Atkins	Costain	21.2	Oct 80	Dec 82/ Apr 83
	Passingford Bridge	Brentwood	5.2	8.3	A12	Three-level interchange with A12. Crosses River Roding	11	ERCU (Essex SU)/ Ove Arup	Laing	19.9	Jan 81	Apr 83
28–29	Brentwood	North Ockendon	5.4	8.6	A127	Deepest road cutting in London clay	11	Mott Hay & Anderson	Costain	31.1	Oct 80	Apr 83
29–31	North Ockendon	Stifford Road	2.5	4.0			3	Mott Hay & Anderson	Laing	7.2	Sep 79	Dec 82
	Stifford Road	Mar Dyke	1.4	2.2	A13	A13 viaduct across Mar Dyke Valley	7	Mott Hay & Anderson	Laing	11.0	Jan 79	Dec 82
	Dartford Tunnel Nthn Approach		0.8	1.2		Widening and reconstruction	—	Essex CC	Fairclough	1.5	Spring 81	Nov 82
	Dartford Tunnel		1.4	2.2		The Dartford Tunnel and its approaches form the A282 and are administered by Essex & Kent County Councils	—	(1) Mott Hay & Anderson	Edmund Nuttall	11.1	Mar 57	Nov 63
								(2) Mott Hay & Anderson	Balfour Beatty	33.4	Jun 72	May 80

SCANNED BY SIMON TAYLOR 26 NOV 23

How much have you got to say for yourself?

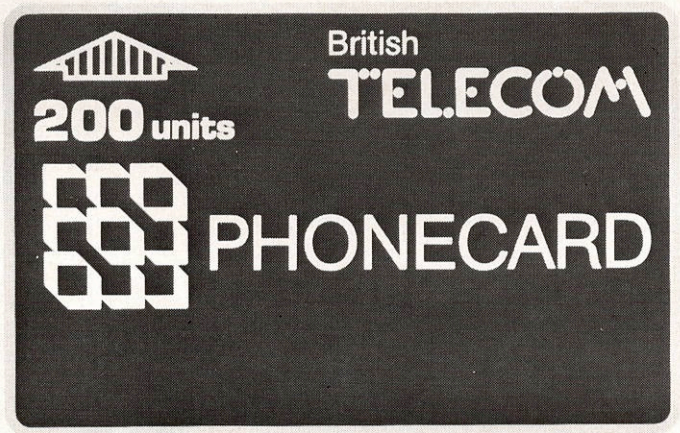


10 calls. For those who like small talk.



100 calls. A gift for those with the gab.

40 calls. For those with a bit more chat.



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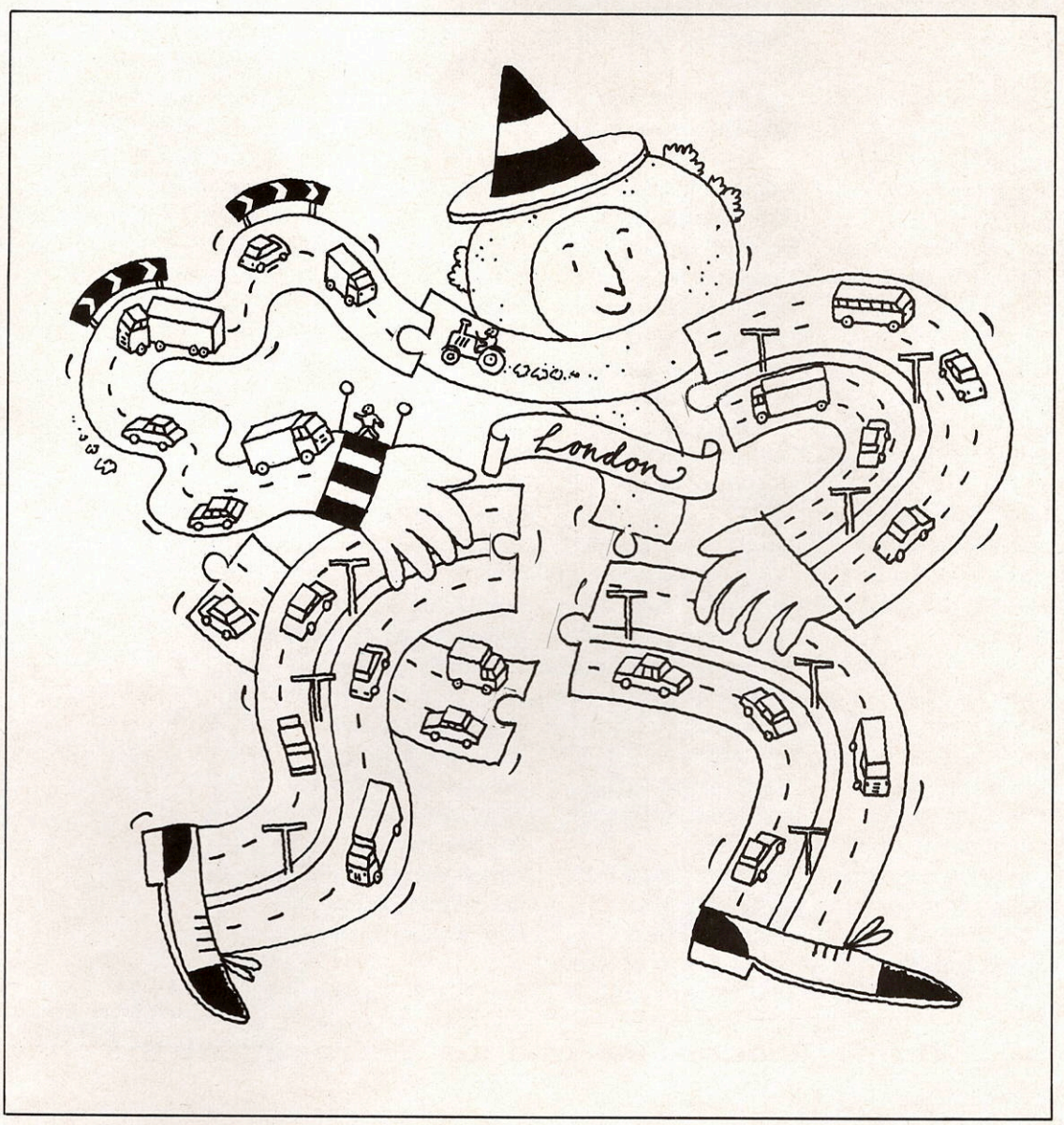
THE M25 REPLIES...

The Department of Transport has said much about the M25. But what of the road itself? Until now it has kept a polite silence. Author, playwright and humorist KEITH WATERHOUSE translates its response.

Secretary of State, distinguished guests, ladies and gentlemen, I am more touched than I can possibly put into words at the very warm reception you have so generously accorded me on the occasion of my inauguration as the M25. I shall strive with all the powers at my command, ably assisted I know by my loyal and hardworking access roads, to become a credit to the motorway system. Should I fail in this endeavour, then I shall deserve every traffic cone thrown at me.

This is a time, Minister, for looking forward, not looking back, but perhaps at this special moment in my life I may be allowed to indulge myself for a moment to recall a time long ago when I was nothing more than a series of farm tracks and twisting lanes bearing traffic no heavier than a haywain or a gypsy caravan. At that time the height of my ambition was to become the B2404. Little did I think then that I should one day be rubbing hard shoulders with juggernauts!

But macadamisation came, and with it came new responsibilities and new horizons. I was asked to take on the burden of the motor car, the omnibus, the van, lorry and pantechnicon, even the occasional charabanc. I threw myself into this exciting but



ACKNOWLEDGEMENTS

Main cover photo: A3 interchange at Wisley, Surrey. Fairclough. Photo: Philip Lane Photography. *Inset photo:* A3 interchange under construction. Photo: Handford Photography.

Inside front cover: Aerial view of complete motorway. Photo: Clyde Surveys Limited.

Pages 4 and 5. A stretch of the M25 at Brentwood. Laing.

Page 7. Top: Oxford Circus in 1928. *Centre:* Arterial roads in the 1920s and 1930s were often filled to capacity. *Bottom:* Small sections of bypass were built during the 1960s and 1970s. Photos: The Photo Source.

Page 8. Abinger Hammer after the opening of the Reigate to Wisley section. Photo: Cassidy and Leigh.

Page 9. Examples of the use of cuttings and false cuttings. Photo: P Herrin, Kent County Council.

Page 11. A stretch of the south-west section. Photo: Aero Industrial Photographic.

Pages 12 and 13. Aerial view of Holmesdale Tunnel at Waltham Cross, Herts. Tarmac. Photo: Handford Photography.

Page 14. Top left: Bell Common Tunnel, Epping Forest. Laing. Photo: Morgan Wells Studio. *Top right:* Bell Common Tunnel section during construction. Photo: Laing. *Bottom:* Low voltage switch gear room, Bell Common Tunnel. Photo: Morgan Wells Studio.

Page 15. Top: Bell Common Tunnel section showing reinstated cricket pitch. Laing/Tarmac. Photo: D A Bradbury. *Inset photo:* West Essex Gazette. *Bottom:* Upshire Hall lodge. Photo: COI.

Page 17. Top: Bridge carrying the Chertsey – Virginia Water railway line. Bovis. Photo: British Rail. *Bottom:* Two views of New Haw viaduct during construction. Balfour Beatty. Photo: Sealand Aerial Photography. *Bottom right:* New Haw viaduct completed. Photo: Richard Turpin.

Page 18. Three views of Runnymede Bridge. Bovis/Fairclough. Photos: Handford Photography.

Page 19. Chalfont viaduct. Laing. Photo: Marcus Taylor.

Page 20. Top: Junction 7 (M23) Merstham. French Kier. Photo: Handford Photography. *Bottom left:* Junction 15 (M4) during construction. Cementation. Photo: Handford Photography. *Bottom right:* Junction 15 (M4) looking south-west. Photo: Aero Industrial Photographic.

Page 21. Top: Junction 16 (M40) in the Alderbourne Valley. Tarmac. Photo: Marcus Taylor. *Centre:* Junction 21 (M1) during construction. Balfour Beatty. Photo: Sealand Aerial Photography. *Bottom right:* Junction 27 (M11) at Theydon Garnon. Costain. Photo: Handford Photography.

Page 22. Bottom left: Polhill Bridge. Laing. Photo: P Herrin, Kent County Council. *Bottom right:* Work on the motorway corridor – Polhill Bridge. Photo: P Herrin, Kent County Council.

Page 23. Bottom left: Example of earth-mounding – Polhill Bridge. Laing. Photo: P Herrin, Kent County Council. *Main photo:* The Swanley–Sevenoaks section. Laing. Photo: Philip Lane Photography.

Page 25. Top left: Badger underpass. Photo: Forestry Commission. Centre: Deer-proof fencing. Photo: COI. *Bottom:* M4 interchange. Cementation. Photo: Aero Industrial Photographic.

Page 28. Top: Excavated Anglo Saxon grave. *Bottom:* Anglo Saxon cemetery at Polhill. Photos: B J Philp for KARU.

Page 29. Late Bronze Age antler cheek pieces (horse harness). British Museum.

Page 30. Top: Belhus Park. Photo: Essex County Council. *Centre:* Iron Age pottery kilns – M40 excavations. Photo: Bucks Free Press. *Bottom:* Neolithic worked flint arrowheads (left) and points (right). Photo: British Museum.

Page 31. Godstone Control Centre. Photo: Surrey Constabulary.

Page 32. Lane discipline on south-west sector. Photo: Aero Industrial Photographic.

Page 37. Left and inset: Details of work during construction of Dartford Tunnel approach. Laing/GEC/Birse. Photo: BICC Limited. *Main photo:* Aerial view of Dartford Tunnel. Photo: Handford Photography.

Page 38. Artist's impression of South Mimms Service Area.

Page 40. Top: Deer in Knole Park, Kent. Photo: The National Trust. *Centre:* Chartwell House, Kent. *Bottom:* Windsor Castle. Photos: COI.

Page 43. Aerial view of Brands Hatch motor racing circuit. Photo: COI.

Page 44. Surveyors from the Ordnance Survey. Photo: Ordnance Survey.

Page 45. Top: Construction of an overbridge. Photo: P Herrin, Kent County Council. *Centre:* South-west section near Chertsey. Photo: Aero Industrial Photographic. *Centre left:* Construction work at the Yeoveney–Poyle section. Balfour Beatty. Photo: Philip Lane Photography. *Upper centre right:* Construction of Polhill Bridleway Bridge. Laing. Photo: P Herrin, Kent County Council. *Lower centre right:* Using a paving train on the Maple Cross section. Laing. Photo: Laing. *Bottom:* A3 interchange at Wisley, Surrey during construction. Fairclough. Photo: Handford Photography.

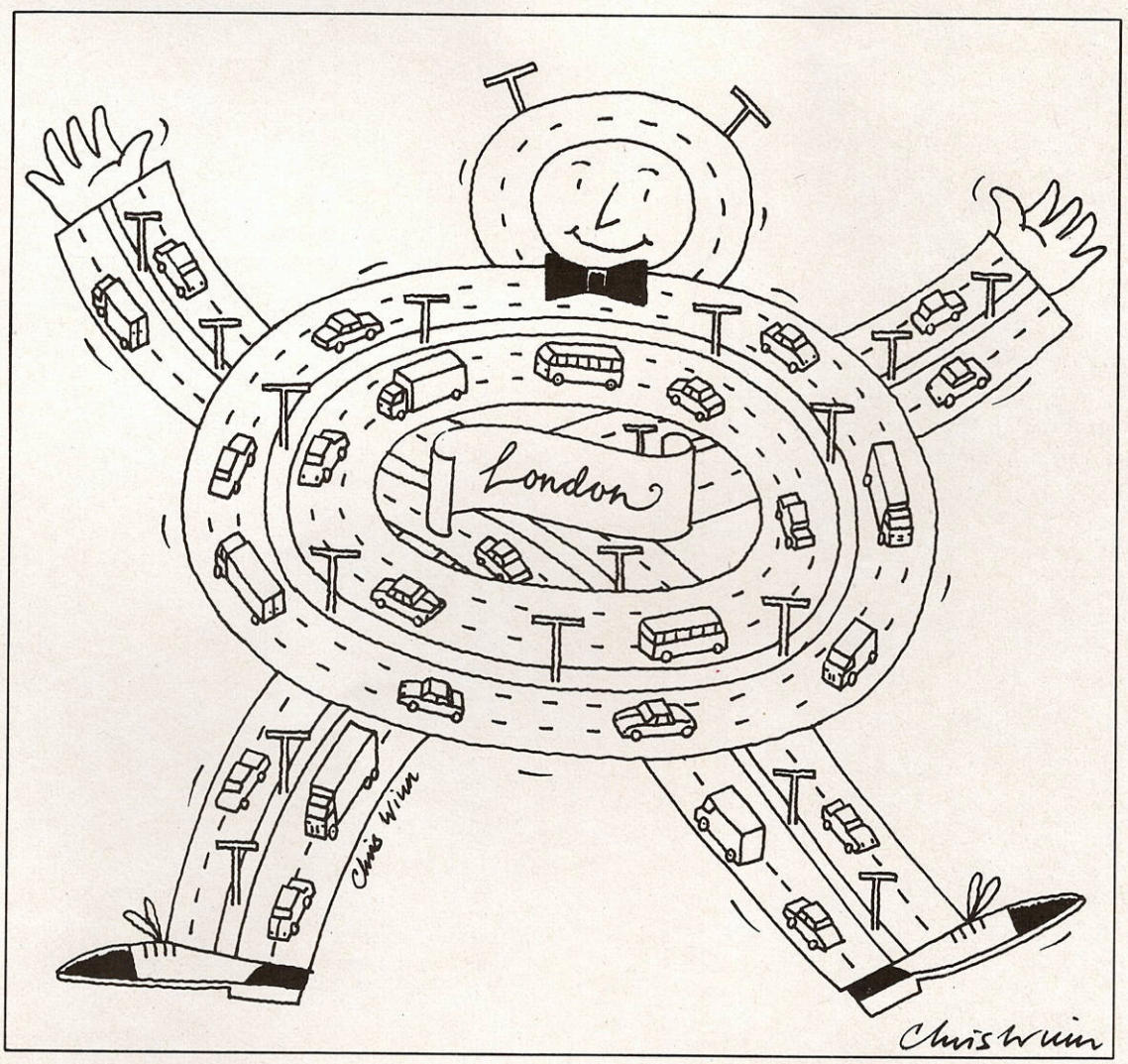
Page 56. Aerial view of the M11 interchange at night. Costain. Photo: Handford Photography.

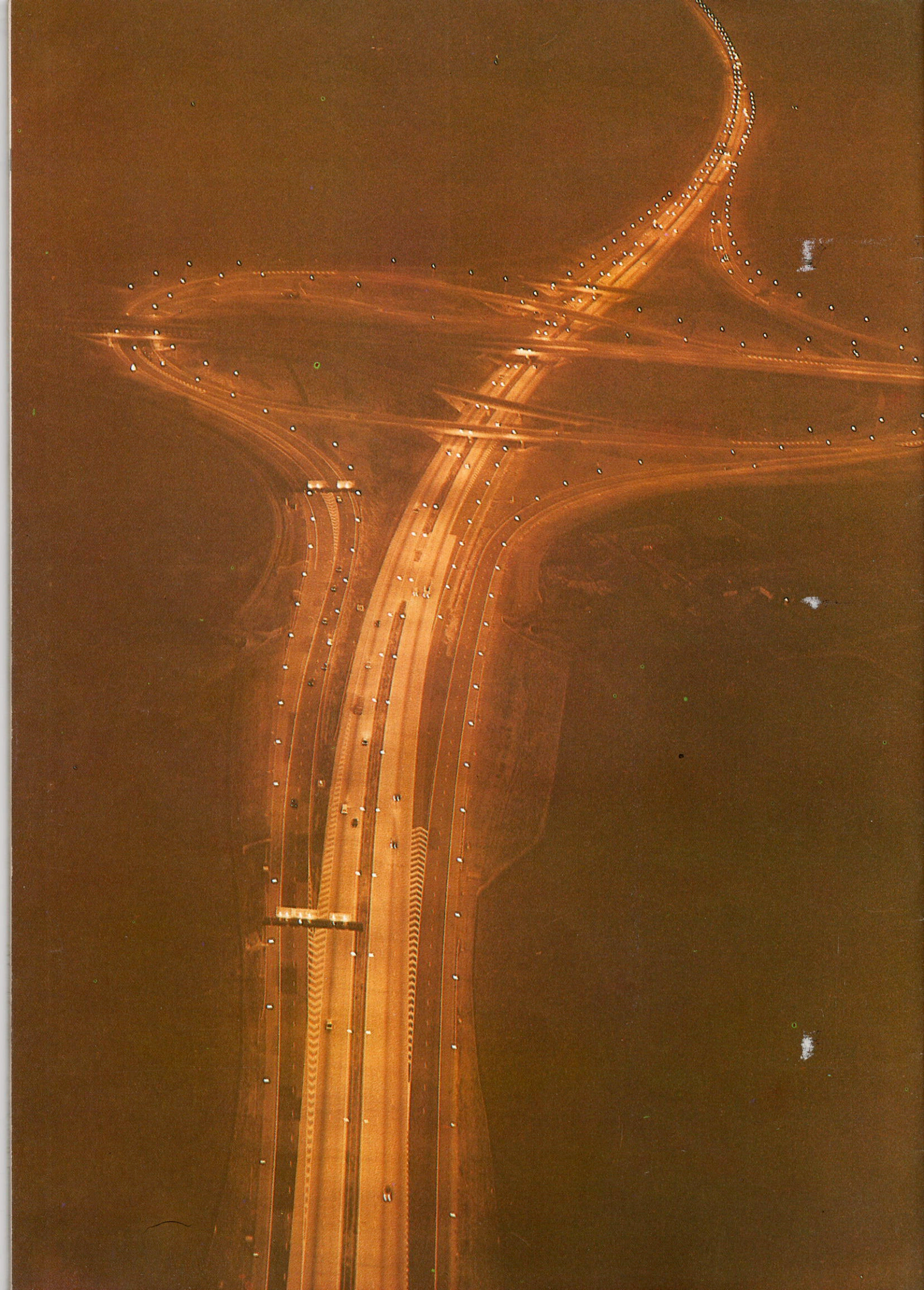
exacting and exhausting role with gusto, working 24-hours a day with only the most primitive of street lighting, making many mistakes on the way but learning all the time in this important pioneer work we were doing. Fired with enthusiasm, by now I had a clearer idea of what I meant to do with my life. The future beckoned. I wanted to become a ring road.

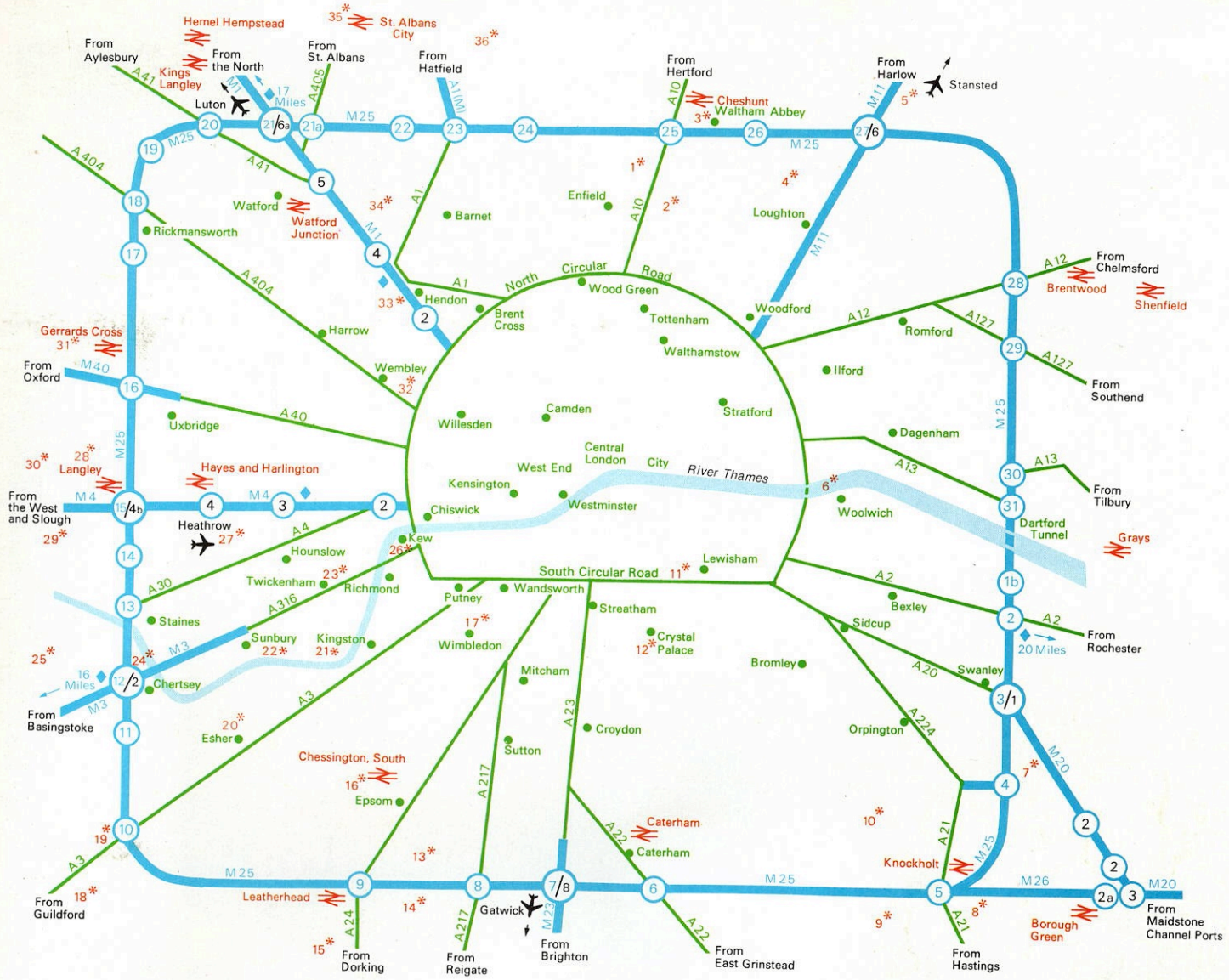
Minister, ladies and gentlemen, I will not weary you with my *curriculum vitae* as it unravelled from the moment of that crucial decision. Suffice it to say that after many ups and downs, advances and disappointments, I was set on course to become that motorway to which you have all been so kind today. If I look back to an era of melting gas tar and granite chips, of cats' eyes and traffic lights, of T-junctions and bends for next two miles, it is not with nostalgic regret but in a spirit of wonder, that we have made such colossal strides from such humble beginnings. For my part, I should like to thank all the excavating machinery, road-laying plant and human engineering skills without which I could not have hoped to have been anything more than a big pile of sand.

What, now, of the future? It is not for me to predict what technological advances may be in store as we motorways gird ourselves for a computer age when we may communicate directly with the vehicles that travel along our surface, and other such wonders — that is for the backroom boys to work out. My role, now that I have reached the peak of my profession, is to rise to every challenge, to provide a fast and smooth journey for my tens of thousands of clients in all weather conditions, and not to crack up under stress. Minister and ladies and gentlemen, God bless me and all who drive on me. I thank you.

Keith Waterhouse







PARK AND RIDE

If you are visiting Central London and prefer not to drive all the way in, it may be possible to park your car at a suburban railway station and then take the train.
Try to avoid the busy morning and evening periods.
Park-and-ride stations are shown on the map.

Motorway	M25
M25 junction numbers are printed in blue, other motorway junction numbers are printed in black	3/1
Major routes in London	A3
British Rail stations with park-and-ride facilities	
Motorway Service Areas	
Places of interest open to the public	15*

TOURIST DESTINATIONS

1 Forty Hall
2 Lea Valley Park
3 Waltham Abbey
4 Epping Forest
5 North Weald Airfield
6 Thames Barrier Visitor Centre
7 Brands Hatch Motor Racing Circuit
8 Knole
9 Chartwell
10 Biggin Hill Airfield
11 Horniman Museum
12 Crystal Palace Sports Centre
13 Epsom Racecourse
14 Box Hill
15 Polesden Lacey
16 Chessington Zoo
17 Wimbledon
18 Clandon Park
19 Wisley Gardens
20 Sandown Park Racecourse
21 Hampton Court Palace
22 Kempton Park Racecourse
23 Twickenham
24 Thorpe Park
25 Ascot Racecourse
26 Kew Gardens and Palace
27 Heathrow Airport Visitors Gallery
28 Colne Valley Park
29 Windsor
30 Cliveden
31 Bekonscot Model Village
32 Wembley Stadium Complex
33 RAF Museum
34 Aldenham Country Park
35 St Albans
36 Hatfield House

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